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STORIES



The Ghastly Future of Man If He Uses The Atom for War!

SO SHALL YE REAP! by ROG PHILLIPS

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All Stories Complete

- SO SHALL YE REAP** (Novel—65,000).....by Rog Phillips..... 8
Illustrated by Malcolm Smith

A scientific picture of the future. A look-see at tomorrow after the atoms do their dirty work—in a light not publicly considered to date.

- THE PROP** (Short—7,000).....by William Lawrance Hamling... 44
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He was just a kid, taking his pony on a ride—but he found a space ship and took off in it for the skies, not knowing that it wasn't real!

- NEGATIVE PROBLEM** (Short—6,700).....by Frances Yerxa..... 58
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What do the words, negative problem, suggest to you? A problem that has a negative answer? Well, maybe—but what on earth is a negative problem?

- FIRST ROCKET** (Short—4,500).....by D. Richard Sharpe..... 72
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Imagine it—pilot of the first rocket to leave the earth! It's a thrill beyond compare, and here it was at last. But there was a catch to it . . .

- MER-WITCH OF ETHER 18** (Novel—12,500).....by Richard S. Shever..... 82
Illustrated by Julian S. Krupa

Deep in space, in what science calls the ether, swam a lovely mermaid; she was an inhabitant of a world far beyond our earthly comprehension!

Front cover painting by Arnold Kohn illustrating "So Shall Ye Reap"

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The

OBSERVATORY

..... by the Editor

AMAZING STORIES has a long record of prophecy. If we had predicted the Texas City disaster, that would have been prophecy. Or would it? Such disasters could be predicted all the time by anyone, and there would be no prophecy involved—it would be a sure thing! How? Well, it seems fairly certain now that the big blast was touched off by a cigarette butt! And the Chicago hotel fire that killed so many was also started by a cigarette butt. The other hotel fires seem have begun the same way. So, there is nothing at all *amazing* about such disasters. That's why we mention it. It's *not* amazing, but it's a darn shame! Be careful with that cigarette! The things it can do *are* amazing! And terrible!

THIS magazine devotes its pages to what is called science fiction. In other words, it bases its stories on what scientists tell us. All kinds of scientists. Engineers are scientists. And we, the editors, have a beef about scientists that we want to get off our chest—especially the engineer type of scientist. It seems (and we've devoted quite a study to it) that engineers know things about stresses and strains and design things with that knowledge in mind. Well, they recently designed a kitchen sieve made of plastic which is so engineered that it breaks almost immediately so that you have to buy another one. They place an "indentation" which is camouflaged as a "design" or "ornament" on the handle at the precise place of greatest strain. It's a "design" all right, but one AMAZING STORIES' type of scientist will always decry. And say it isn't true!

BY NOW you've guessed it—this editor is definitely not feeling well. He's in a beefing mood. But experience has proved to us that we can blow off steam with items like this, and wind up beaming like an idiot. So let's beam over the stories in this issue.

AND we have reason to beam. This issue we have a complete 65,000 word novel by Rog Phillips called "So Shall Ye Reap" and for all we know, so you shall! This is a story about the atom, but not really about the atom—because it

tells us what might very well happen not so many years from now. They talk of atom wars now. That's just talk. The war seems to be going on very well without the bomb. Only desperate fools would actually use the bomb. But who knows when we may come up with a desperate fool.

ANYWAY, when you read this story, don't pass it up as the work of just any old hack writer—because Rog Phillips (no, that isn't his real name) is not even a writer. He *can* write, and does, but he's really a top modern scientific mind, and he's telling us things through fiction that we ought to know, but the rest of the world has neither the knowledge nor the guts to tell us. (No, we won't tell you his name either.)

WHEN you've read the story, take stock of yourself, and the world around you. Maybe it doesn't look so simple now, eh? Maybe you can't look up at the blue sky now and just passively admire its beauty. Maybe you'll see that the beauty will always be there, but you, or your kids, won't! Think of it, because it's time we all began to think of it. If it isn't too late . . .

WILLIAM LAWRENCE HAMLING, who is now one of our editors, still writes. But he doesn't get paid for it (it says here). But just the same he tells us he's more proud of his story in this issue than any other he's ever written. It's a little yarn about a little lad and a space ship. It's called "The Prop" and the whole plot to the story lies in the title. See if you can guess it.

REMEMBER Leroy Yerxa? Who doesn't! Well, here's a nice surprise for you. Frances Yerxa, his widow, has written a story for us. Yep, a story that reveals something we've suspected for a long time, that Frances had a large part to play in the writing of all Leroy's stories. Anyway, if you don't admit that she can write as well as her illustrious husband, you just never admit anything. "Negative Problem" is an entertaining bit of fiction, and we'll vouch for it.

SPEAKING of stories about kids and rocket ships, here's another one, by D. Richard Sharpe (no, not a pen name for artist Sharp!) called

"First Rocket." We think you'll enjoy this little short. It has some surprises in it.

TO COMPLETE the fiction in this issue is the story that got crowded out of the June issue, Shaver's "Mer-Witch Of Ether 18." This one is a peculiar story, in that Mr. Shaver took the challenge of the spiritualists and wrote a story about what you might call "spirits." Anyway, it's about a race of people who live in the ether, and that's where "spirits" are supposed to live. Anyway, if they live at all, that's where we'd hazard they lived! We think you'll find a great deal to think about in this story. And don't take it as all hog-wash. *Never* take Shaver that way.

RECENTLY one of our readers, who doesn't like Shaver (there are a few, believe it or not) wrote us complaining of how much Shaver we were presenting. *He* is full of hog-wash! We could name a dozen authors who have appeared in enormously greater volume than Shaver. In fact, right now, such guys as Livingston, Wilcox, McGivern, Williams, etc. are much more prolific. They have pen names, Shaver has not. Anyway, as a demonstrating point, let's start with April 1947. That issue was Harold Sherman's novel, "All Aboard For The Moon." Next was May, with Don Wilcox's long novel "Desert Of The Damned." Then came June, with Shaver's "Mystery." July was Geier's novel, "Hidden City." August brings us "So Shall Ye Reap," complete hook-length novel by Rog Phillips. September we have "The Star Kings" by Edmond Hamilton, a very long novel, coming up. October will bring another novel, and November still another, neither by Shaver. In short, out of eight consecutive issues in which the novel takes 70% of the contents, Shaver appeared only once, with 70% of the contents. This reader of ours claimed our magazine was filled with nothing but Shaver. Well, if we could get *more*, we would! And that comes straight from the demands of at least 70% of our readers. But why should we defend ourselves against a statement like that? It seems to be obvious. If we were to cut out all authors who "hog" issues, we'd have to cut out the issues. And would you like to have us do that!

WE ARE presenting more proof that Shaver knows what he's talking about in this issue. It is contained in the article by Vincent H. Gaddis, called "Tunnel Of The Titans." When you've read this proof of the existence of vast reaches of underground tunnels, roadways, caverns, and the ruins of incredibly ancient civilizations underground, you won't be so sure that Shaver is pulling your leg. At least, your editors would never stick out their necks and say it isn't so—not any more!

THE articles in this issue are something we are proud of. We have been getting more and more praise on our fact and theoretical science ar-

ticles. In fact, many readers claim they read these features before they do the stories. And lately we've been able to contact an increasing number of writers who can do this type of article so that we can present this material as something more than just "filler" material. We think you'll like this issue and following issues even more on this account.

FOR those readers (ouch, what a pile of letters!) who wrote wanting more information on the Hilsch tube, we have an informative article in this issue including diagram. Don't miss it, and if you build one, you won't be alone!

WAY back in August 1935 we ran a little story called "Music Of The Spheres" which some of you old-timers may remember. Well, the author, S. J. Byrne, has resumed his writing after a very long time, and we now have a novel on hand which we think will hit you right between the eyes. It seems that it took the Shaver Mystery to bring this author back from his retirement, and we can tell you he came back with a bang. You'll read the story before too long, and you'll read others. If you think classics were written in the old days, well, the old classic-writers are still alive, and this particular classic-writer will take no back seat to any more recent writer!

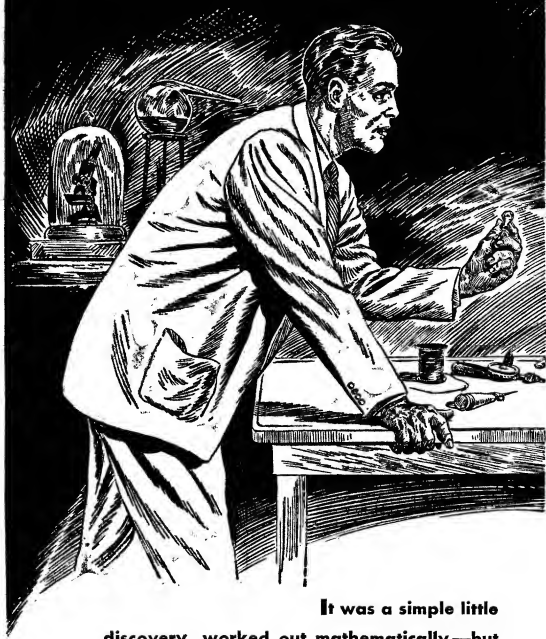
HAS the Moon an atmosphere? Well, the question is taken up in still another article in this issue, and after reading it, we're inclined to throw out our old ideas about it. Maybe we take too much for granted in astronomy today. Maybe the universe isn't as "pat" as we've got it in our "ill" ole textbooks! Be seeing you! *Rap*



"Ah, Plobo, the exquisite beauty of the nebula in Andromeda! A magnificent spectacle!"

SO SHALL YE REAP!

by ROG PHILIPS



It was a simple little discovery, worked out mathematically—but it made the atom bomb seem inconsequential

SO SHALL YE REAP!

by ROG PHILIPS



It was a simple little discovery, worked out mathematically—but it made the atom bomb seem inconsequential



"I guess this will give some of our scientists the heebie-jeebies trying to figure out!"



"I guess this will give some of our scientists the heebae-jeebies trying to figure out!"

RON sat on the curb, his small bare feet in the gutter, eyes aglitter with intense alertness. Beady, faceted eyes appeared in the gloom, several feet down the circular well which yawned at his feet.

He stopped breathing, hoping that his smell would entice the insect out of

its hole. Firmly grasped in his right hand was the metal hook with which he hoped to secure his prey and drag its squirming body out onto the pavement. Then he could eat.

Thick chunks of delicious white meat would be torn out from under the rock-hard, exo-skeletal casings of its legs.

AUTHOR'S NOTE: Prophecy is a game played seriously by some, a gift sought seriously by others, and the stock in trade of certain classes of seers and "spirits." Yet what is prophecy?

He who prophesies correctly gains a certain air of authenticity and infallibility. The spiritual adviser, for two dollars, says, "A dark man is coming into your life. You will have three children and be married three times." The gullible female believes it. Didn't she pay the two dollars?

She meets a very nice fellow and marries him; but in the back of her mind is the ominous, infallible prophecy, "You will be married three times." So—one day she and her husband have a quarrel. And she says to herself, "Since it's coming sooner or later anyway, it might as well be now." So she leaves him. Maybe the husband won't let her get a divorce, so she has to kill him to let the prophecy come true. She's caught and hanged, and has to re-incarnate to fulfill the prophecy. But she DOES fulfill it, come hell or high water. After all, it was a prophecy, wasn't it?

Then there's the guy who wants a little fame and maybe he has ambitions about being proclaimed wise above all other men. He isn't too smart. He doesn't have the knack of getting bright ideas. Prophecy appeals to him as the sure road to what he wants. So he collects prophecies, sees how they have come out so far, keeps the ones that have proven infallible to date, coordinates them, and writes a book on prophecy. He even believes it himself. And you can buy it right now. Oh, yes! There are dozens of small fry like this, competing for top honors in the field of prophesying gloom, death and taxation. They all seem to make a living at it, too, one way or another.

Above the charlatan and the seeker after the cloak of infallibility, on a plane by himself, is the person like Oswald Spengler, a serious, industrious scholar, who masters the whole of world history, coordinate it into one consistent pattern, and by means of this proven pattern, which he has systematically derived from our past, predicts the general trends of the future. His "Decline of the West" is a monument to intellectual industry for which the Germans have always been famous. It is worth real study.

On the same plane, but perhaps on a more practical basis, is the man, H. G. Wells, who, long before his recent death, had proven himself many times over as a fairly accurate prophet. So accurate have been his prophecies in the past, that I

have often suspected Great Britain of basing her foreign policy on his books as they came off the press. It would be quite funny, I think, if it were ever proven that the lineup in the First World War was what it was because H. G. Wells had predicted it would be, and not the other way around: that his insight into world affairs had enabled him accurately to estimate the lineup.

In everyday life we have the practical prophet; the man who sizes up situations and estimates their future states, and adjusts his own affairs to fit into the future to his monetary advantage. If he becomes powerful enough he gets to the point where he can even compensate for errors by adjusting affairs and molding the future to his ends.

But that ceases to be prophecy. In the popular mind prophecy must predict change. Something different. A weather prophet who predicts sunshine tomorrow when it is sunny today is not considered a prophet. If he predicts rain tomorrow when there is no chance of rain, and it rains, he is a prophet.

The man who publicly prophesies there will be no world catastrophe next year is no prophet. It is the man who warns of dire calamity, who advises you to fill your basement with potatoes this year because there will be a seven-year famine starting next year, who says, "get out of the cities and go into the country and find a small place where you can be self-sufficient because by next year there will be revolution, rioting, and famine in the cities," he is the prophet.

In your own mind, isn't that what prophecy means? Suppose you go to a spiritual adviser and he says, "You are married, are going to stay married, will keep on working for about the same money the rest of your working days, and will live to collect a fair part of your old age benefits." You would feel cheated? Of course you would. That's the way things are now! You should get a better prophecy than that for two dollars!

So the prophet, knowing this popular conception himself, tries "honestly" to give you your money's worth.

Underlying prophecy are two radically different basic conceptions. (1) The practical one. Estimation of what can come out of existing things. (2) The spiritual one. "Contacting" the All Knowing, to whom the future is as open as the past.

Under the second heading comes the "Book of Revelations," the pyramids, and a few other pro-

Delicious, creamy juices would drip from its carcass, which would satisfy his thirst and save him the long trip to the lake.

So he waited, breathless, for the giant cockroach to emerge. At his back, rising a full twenty-four stories, was a brick building. Over his head in the street was the gloomy structure of the El tracks. For this, although Ron did

not know it, was the loop in Chicago, 2196 A.D. All he knew was that in some one of these dark entryways along this street he had been born, his mother writhing in the agonies of birth, while some other woman watched.

He knew that because he had seen many babies born, and was himself a father. His mother was dead now. She had died when he was three years old.

phesies made long ago and "proven" authentic over the past couple of thousand years. Under the first come Wells, Spengler, and others.

But underlying both types of prophecy, I think, is something akin to the first. If a man is really immortal in spirit, and the universe is really limitless and has always existed, there should have been many other planets with intelligent, immortal creatures on them, whose spirits have outlasted the planets on which they first came into being, and have seen the birth and death of many hundreds and thousands of planets since then.

If such is the case—and there is a book called "Oahspe" which asserts it to be so—then what we are going through today is old stuff to them. With the experience gained from observation of thousands of races going through what we are in today, they would be in a position to know with pretty fair accuracy what things will be like here, not only for the next few years, but for the next few thousands of years. Especially if they can influence the course of events to any extent.

All of this brings us up to a very intriguing point which forms the basis of this story. Suppose that in spite of all their know-how and experience **SOMETHING UNFORESEEN HAPPENED?** Or suppose that on the thousands of worlds they have had experience with, there were two separate ways things could go?

Suppose that at a certain stage of the game they could say with certainty that there were two different paths future history could take? They could prophesy accurately up to the branch and then GUESS which way we would go. Just as you could prophesy that a man getting ready to flip a penny would flip it—then guess whether it would come down heads or tails.

Or, suppose that in their observation of thousands of planets they were confident which way things would go, but **SOMETHING NEW** happened. Something that had never happened before. **SOMETHING SO STUPID THAT THEY DID NOT CONSIDER THE POSSIBILITY OF INTELLIGENT HUMANS OVERLOOKING IT? BUT IT HAPPENED.**

What would they do? That is hard to say. Assuming they had our welfare at heart, considered us blood brothers under the skin, and so forth, they would probably do what they could to help us meet this unforeseen future successfully.

But they would be handicapped by the certainty that all their nice prophecies which *were* going to be borne out to the letter would be proven false, and they would be discredited.

That is all a nice field of speculation. If these spirits saw the thing that was going to happen before it happened they would naturally try to prevent it. Maybe they couldn't stop it at the source. Then they would try to bring public pressure to bear against it happening. If that failed they would have to make the most of things. Maybe they would throw in a new prophet. Maybe they would discard prophecy and just try to get over certain basic ideas to help tide us over, by inspiring some "campaign." Maybe the whole thing did happen, once long ago, and they might "inspire" some writer to set down what happened then, so that we would have that "history" to draw on in the crisis just before us, assuming there is a crisis.

However that may be, we have an intriguing problem. What single thing, which has already happened, could put the entire human race in a fix it couldn't undo, which would threaten our very existence?

It could be that that irrevocable act hasn't taken place yet. It could be that I am "inspired" to write this story so that **IT WILL NOT HAPPEN.** It could be that there is no possibility of such a situation arising at all. Assuming for the sake of argument that the idea for this story came to me as inspiration from some spiritual source, the story itself is pure imagination. So far as I know, the idea for it is also the result of imagination. So let me say now that **THIS STORY IS NOT PROPHECY.** *The possibility upon which it is based is only a possibility because I don't know whether it is a fact or not.* If it turned out to be actuality the story might come true. If it turned out to be impossible, the story could not possibly become true.

Be that as it may, for the sake of a good plot, I have assumed it to be true; that already we have irrevocably done the deed, with no chance of undoing it, and that the human race is doomed, unless— But that's the story.

In real life, it might be a good idea if we really find out whether this story **MIGHT** come true. *Right now, if it isn't too late already.*

—ROG PHILLIPS.

She had been an old woman when he was born. At least thirteen. And no one lived more than fifteen years ordinarily. But there had been no severe Geig storms for several years, so lots of the old people had lived an extra year or two about that time.

The cockroach hooked its front legs over the edge of the hole and sniffed at Ron's feet. He knew it was aware he was a human. The only question in its mind was whether he was dead or not. At the instant experience had taught him was just right he hooked the creature in the thick of its back and braced his legs for the tug of war. It was soon over. He had the cockroach on its back on the pavement and was tearing its legs off, one by one, so that it could not escape.

No sooner was a leg torn off than a new one sprouted from the open wound. If Ron cared to wait, in a few hours this new sprout would be a new leg. He had done that once and found that the meat of the new legs was too soft and tasteless. It grew too fast and did not have the firmness that only days of exercise could give it.

With the creature helpless, he pounded a leg against the concrete sidewalk until the shell broke. Then he tore out big hunks of the quivering white meat and sank his firm white teeth into them. This cockroach was full grown. Over two feet long. More than a meal for him.

In his eight years of existence he had never seen larger ones. Every year they got larger!

FROM the gloom of the street opening to the building at his back, two female figures emerged timidly. Strong in their minds was the time, two short weeks before, when Ron's third wife had emerged too soon and caused him to lose his prey. He had thrown her

after the escaping cockroach, to fall screaming down the shaft of the sewer opening, food for the myriad giant insects that multiplied prolifically beneath the streets.

Betty, the younger of the two—six years old—reassured by Ron's ignoring of their advance, darted forward first and seized one of the legs lying beside the cockroach's quivering body.

The fast growing embryo that pushed her stomach out to alarming proportions made such demands on her body that her digestive system could barely supply her needs. In fact, in the five months from gestation to birth, the embryo would make such demands that she would emerge from the ordeal with very little flesh and no fat left.

Amy, older by two years than her fellow wife, and consequently more cautious, waited until she was sure Ron would not get mad, then, laying her two months old man child on the pavement where he could lap up the juices of the dripping cockroach—nourishment her undeveloped breasts could not provide—she seized one of the legs, cracking it expertly against the curb.

Finally, their appetites satisfied, the three crept back into the protection of the building, Amy carrying her child with her.

There they watched idly as other cockroaches and the dangerous newts crept out of the sewer opening and cleaned up the mess they had left. When they departed there would not even be a smell left.

Ron glanced worriedly at his Geig. Its needle presaged a storm. It had been hovering in the pink area on the dial all day. If it crept into the red, or even went up a little bit more, he would have to lurk in some dark basement for days until the storm passed. Sometimes a wind blew the storm away in a hurry, but not always.

Right now there was no wind. The air was hot and humid. It felt like steam against his skin, and rivulets of sweat trickled down his naked skin, leaving streaks in the dirt.

If the Geig storm came, and there was no wind, it might last for weeks. Then many, many people would starve, and lose their minds and go out into the streets. Then when the storm passed the streets would be littered with the dead and dying, their skins seared pink, large areas turning white and falling away, until they died. Then the cockroaches would come out of their holes and drag the bodies back down with them.

The cockroaches always multiplied faster after a Geig storm. But when the supply of human corpses ran out they would get hungry and dangerous, and their meat would get tough and thin out, so that one cockroach would not be a full meal for three or four people.

When there were no Geig storms the normal death rate of the humans supplied the right amount of extra food for the sewer dwellers above what they got from the rats and smaller insects that lived with them. These wandered in from the surrounding country where they lived on vegetation mostly. Curiosity brought them.

The cockroaches never left the city. Humans sometimes did, although Ron never had. There was a legend of an Opening. What this Opening was, no one seemed to know. It was the answer to all their troubles.

The Geigs wore out in time. They would last three or four lifetimes if they weren't dropped. At the Opening you could lay your old Geig on a stone and it would disappear. After a while another would appear in its place. A bright shining one with a smell of banana oil and bakelite.

There was supposed to be a big door

at the Opening. Legend had it that about every three generations the door opened and giants came out and took someone in with them. Ron didn't believe this. Someday he would go see this Opening for himself. All you had to do was keep going west. If you went far enough you would leave the buildings behind and eventually come to the Opening. *If* it existed.

RON kept his eye on the Geig while his food digested. Betty and Amy slept. The baby crawled exploratively around them, never going far.

Imperceptibly the needle crept up toward the red. Finally Ron woke Betty and Amy. They followed him through the inner hall of the building to an opening that led downward. In a few hours Ron would creep back up where it was light with his Geig and see if the radiation concentration had lessened any. But first he would sleep.

Betty or Amy would keep awake. One of the three always had to keep awake. They had the building to themselves, but someone might come. Sometimes Geigs were lost. Then the unfortunate loser would try to steal somebody else's. And sometimes when females were scarce the other men would try to steal wives.

Usually, though, there was no trouble. A man guarded his Geig with his life. And the woman problem was generally the reverse—a man had to drive away wandering women who had no husband or he would have more mouths to feed than one cockroach would satisfy. Then work became doubled. No man cared to take on the responsibility of killing six cockroaches a day if he could satisfy his reproductive urges and only have to kill three of them. He would have to kill three anyway, just to feed himself, since the meat did not keep.

Ron stretched himself out on the basement floor at the edge of the light coming down the stair well. In less than a minute soft snores told that he was asleep.

Betty slept too, shortly, her childish face relaxed.

Amy held her man child in her arms, rocking slowly back and forth, humming a little tune. The baby watched the way her nostrils flared as she hummed. Then it put its small hand to her lips and gurgled delightedly at the feeling of vibration the humming produced. Although only two months old he could understand most of the words his elders used. In another month he would start walking a little, and using a few words himself. At six months he would be advanced as the three year old of two hundred and fifty years before. If he weren't he would die of neglect, because his mother would be unable to look after him and satisfy the demands the next baby would be making on her body.

He would probably die anyway. The average woman produced at least ten babies during her lifetime and yet the population never increased. That meant that eight and a fraction babies never grew up.

Amy smiled at the gurgling of her baby.

"You want me to tell you a story?"

The baby nodded, so she began.

"Once upon a time, long, long ago, there was a nice giant who lived down under the road. He would look up through the road and watch all the little boys and girls, so that if they did anything bad he would know about it.

"When they were good he would chase the roaches up out of the holes so that the good little boy's papa could get them. When they were bad he would stop up the holes and then the bad little boy's papa would not be able to catch

any roaches. Then everybody would be hungry. When they got very hungry the papa would drop the bad little boy down the hole and then the giant would chase the roaches up the hole so that the papa and everybody could eat.

"When a little boy is very good and grows up into a very good man like your papa, then sometimes the giant comes up out of his own hole and takes the good man back down with him and then he grows up to be a giant himself, so that he can watch the little boys and girls through the road.

"But if he doesn't, the very good man will still go down and live with the giant when he dies, and then grow up to be a very big giant anyway. And the bad little boy, when he dies will go down into the hole the roaches come out of and be chased by the newts."

RON had awakened toward the last of this story and listened, a smile of amusement on his lips. Now he rose impressively and approached Amy and her baby. With a casually formal stiffness he took the child's hand and said:

"Hello, John."

Amy smiled and tears came to her eyes. Tears of happiness. Her baby was now christened, its future assured, her own status as a wife made certain, and—everything would be all right.

It was a ceremony. One of the few. A girl was driven from her family circle when she was old enough to mate. She wandered through the streets, alone and helpless. It took a man to catch a roach.

She would lurk near the family circle of some man, and when he caught a roach she would dare his wrath and steal some of the dead roach after the rest had had their fill. If she was not driven away she stayed, ready to run at the first frown of displeasure. Often she was tossed down a hole. Sometimes she was tolerated for a few days and

then driven away.

If she were lucky she eventually found a man who would let her stay in his family circle. But she still formed no definite part of it. If she did not soon become big with child she would be driven away anyway. If she had a child, she still did not know if she were acceptable. But when her man *named* her child, it was the unwritten law that henceforth she was his wife until death.

Often her first child would be a freak. Then she would certainly be condemned and chased away. So it was a big event in Amy's life. Now she was what all women **MUST** become or perish before they are ten; a successful mother.

Ron crept up the stairs to the top, his eyes on the Geig. It crept up almost to the red. Outside it would show in the deep red. This was a severe storm. He dared to look hastily around the corner wall of the stair well, along the hall into the street.

Dust was swirling lazily outside. Wind! In a few hours the Geig storm would be gone. With a satisfied grunt he pulled his head back. In that second he had looked, his face had begun to smart. He rubbed it briskly.

Betty was groaning in her sleep. She began to grind her teeth in pain. The sound was sharp and painful to the ears in the intense quiet of the basement.

Ron picked up John, his first child, and sat on the bottom step playing with him. Amy watched her fellow wife sympathetically. After a while the baby came—a girl. Its eyes were open, a good sign. It would be a normal baby. If its eyes had been closed it would have been a throwback, a freak. It would have taken too long to grow up. And Ron would have thrown it down a hole and driven Betty away. Maybe he would have thrown her down a hole too. The cockroaches always hung around holes where they got food. And Ron

had to be practical. If he did not feed the cockroaches human food once in a while they would not be eager to come up and sniff at his feet and get caught.

After Betty recovered somewhat Ron again went up the stairs. This time the Geig stayed in the lower pink even in the hall. So he went back to the hole at the curb. As he sat down he looked up and down the street, hoping he might see a corpse he could toss down the hole. It had been three days now since his hole had been fed. Pretty soon the roaches would leave and concentrate around some other hole. It took an hour to catch one this time.

Betty ate the lion's share. Her baby lapped the white juices beside that of Amy. It would be all right.

The meal finished, Ron started west along the street, and Betty and Amy, after giving each other a puzzled look, followed him closely, carrying their babies on one hip.

Ron had made up his mind. He was going to see for himself about this Opening. His Geig was still good. It had been new with his father, so would be good longer than he would live. It was just curiosity.

Before long they left the security of the tall buildings and the el tracks. Now, occasionally, they passed the bodies of people who had been caught in the Geig storm, their flesh an evil white. Some of them still writhed in the throes of death.

Ron ignored them and Amy and Betty kept close to his heels.

WHEN it got dark they sought the protection of a building. There was a family in it, but the man was old. Over twelve. The man glanced fearfully at Ron, and when Ron showed no signs of hostility the man soon lost his fright and became friendly. He, too, had lived in the loop in his younger

days. When he began to get old he had been driven away by the younger men, as all old men were. The loop had the most roaches, and also it gave better protection against the Geig storms.

When it got light again Ron started on. Betty and Amy followed closely. At a distance a five-year-old girl followed them cautiously. Ron had smiled at her as he left. This was almost enough invitation, but a cautious nature kept the girl at a safe distance. If, by afternoon, Ron had not chased her away, it would be safe to close the gap between her and Ron's family.

Occasionally the procession passed some building still standing, with a group of women and men lurking inside. Most of the buildings had caved in long ago, however, and the standing buildings with their inevitable populations of child adults became fewer and fewer as the day lengthened.

If a person of nineteen forty-seven had been suddenly transported into the picture, he or she would have been shocked beyond description. Chicago had become a children's city, the buildings falling apart, and filth piled high in the streets.

This race of child-adults was not so much the product of a rapid evolution as a brutal weeding out, a survival of those who could fit into the specialized conditions, which were becoming more specialized each year.

The weeding out had left only those males that could reproduce by the time they were six or eight years old. Then, they appeared no more grown up than a naked, dirty ragamuffin of ten or twelve from the poorer tenement section in any twentieth century city. Actually, the only physical changes wrought in them during the two and a half centuries of change were the compressing of ten or twelve years growth

and development into eight or ten. Most of this was accomplished before birth, since the normal baby was now born with its eyes open and quite often with some of its baby teeth.

The shortening by three months of the period of pregnancy was not so much due to evolution as to the richer supply of growth hormones found naturally in the six- to ten-year-old mother. Motherhood came early. The ravages of environment made early motherhood a vital necessity, for long before maturity would be reached the body would succumb to the continued searing of lungs and tissue by radioactive oxygen and carbon, not to mention all the other radioactive isotopes, whose concentrations were increasing daily.

In another fifty years Ron's descendants would be gone from the face of the earth. And the cockroaches that enabled them to live, rich with their white meat, very much like crab in taste and appearance, and with their creamy white juices, rich in vitamins and hormones, would be gone, too. A kind nature would see that the food for the children would outlast the children. Wounded and insulted by the rash folly of man, she still watched over him as best she could.

Ron was not aware of the shortness of the time his race had left to it. He was not even aware that man had ever been any different than he was now.

And the man of nineteen forty-seven is not aware of the flexibility of the race of which he is a member. He does not reproduce at the earliest possible moment. Custom forbids it. There is no source of information on the period of pregnancy of six-year-old children. There is no data to supply such information.

But it is known that a child of six or eight, if it has had to take care of itself from the time it could walk, has the

self assurance and self confidence of the adult.

And, though the population left on the surface in the United States in nineteen forty-nine—to meet its inevitable doom in less than three centuries, only vaguely aware of what was in store—numbered over a hundred million, only a small fraction of these were flexible enough biologically for their descendants to survive.

Old age crept down the scale of years until reproduction was in a race with death. Before growth had even started the hormones and regenerative elixirs created in the body to produce that growth were diverted to the grim task of repairing the ravages of harsh, searing air that tore the sensitive tissue of the lungs, deadly missiles in the guise of life-giving molecules that scarred the sensitive cellulose walls of the tissue cells, and fifth-column atoms in the native tissue of the body itself, that squatted in intimate association with unsuspecting companions and bathed them in their poisonous emanations.

THE sun was high in the heavens when Ron stopped at one of the open manholes in the street. Betty and Amy promptly ducked into hiding behind a still-standing section of wall nearby. The five-year-old girl who had followed them stopped half a block away. Ron looked at her, scowling, and pointed sternly toward the place his two wives were lurking.

With a silent exclamation of joy she darted to join them. She was IN!

The hole had yielded up one cockroach in just a few minutes. Two more climbed out during the course of the meal, to join in the repast in a way they had not expected.

Ron took up his pilgrimage with the three girls following, Betty and Amy eagerly getting acquainted with the new

girl. Ron listened as the girl disclosed that her name was Mary, that she was five, and that her father had consented to her following Ron because he liked his looks.

Ron's dirty, expressionless back hid the smile of pleasure that lighted up his face at this compliment. A man could not let his women see what reaction they had on him. They had to be kept in their place with an iron hand.

Now the city was behind them. Here and there a house could be seen, still standing, but generally with the roof caved in.

At last he paused. The road intersected a well-worn path that led diagonally across the open fields, winding between the piles of rubble that had once been houses.

This must be the way to the Opening.

Stoically he took the path. His eyes glanced anxiously at the Geig and were reassured by the position of the needle—well down into the pink.

If a Geig storm came now he and his wives would be helpless to avoid it.

The sun was sinking rapidly in the west, its light blinding Ron so that he had to squint, when the Opening came into view.

It consisted of a concrete ramp leading downward at a thirty-degree slope, with high side walls to hold back the dirt into which it sank. At the bottom, about fifteen feet straight down from ground level, it dipped up slightly, with open holes to carry off any water that entered.

It ended against a wall into which was set two heavy steel doors. A smaller door was set into one of the larger ones. And at one side of these doors, fixed into the side wall of the ramp, was a black shelf.

"This must be the stone where legend says to put the old Geig for a new one," Amy said, standing beside Ron.

Ron nodded in slight condescension, implying that of course he knew all about it. He was a man, wasn't he?

With a mischievous smile tugging at the corners of his mouth he laid his Geig on the table. It lay there for a full minute, then the table tilted upward, revolving into the wall, and leaving a similar surface in its place.

Regret, worry, curiosity, and fatalistic amusement were on his face as he stood there silently, waiting to see what would happen.

CHAPTER II

THE quiet *whish* sound signalled the arrival of a carrier through the air tubes. Gar Whitely slid his feet off the plastic desk top to the floor and stood up, stretching. He had been half asleep for the past hour.

One whole wall of the large room was an orderly design of six-inch copper tubes which entered from both ends of the room and dropped to a long table, partitioned so that there would be no question which tube the incoming rubber-cushioned carriers came from.

He grunted his surprise when he saw which chute the carrier was in. The one from outside. It had been months since any of the surface people had come for a new Geiger counter. He was even more surprised when he opened the carrier and discovered that the counter was not worn out, but in very good shape.

He read off its serial number and looked on a chart that he hauled out of one of his desk drawers. The counter was only ten years old!

"Curiosity!" he exclaimed in amazement. Then he lifted the desk phone off its cradle and dialed a number. Almost instantly there was a response.

"A counter just came in, sir," he said rapidly. "I thought I should bring it to

your attention because it isn't worn out. It's only ten years old, and is as good as the day it left."

A whistle of excitement came over the wire. After a couple of "yes, sirs," Gar dropped the phone back in place. Then he went over to a large panel and flipped a little toggle switch. A frosted glass square set flush in the panel lit up, disclosing the face of Ron. Gar studied it intently for a full minute.

He strook his head pityingly as he took in the figures of the three girls, and the two babies.

The phone rang, so he turned his back on the picture without shutting it off.

The clipped voice of the man at the other end said.

"Give him a Geiger counter. A new one."

With another "Yes, sir," Gar went to a rack and took one out of a box. He dropped it into the cushioned interior of the tube that had brought the old one and pushed the tube through the opening of an outgoing pipe. Then he went back to the screen.

He saw Ron's face light up with delight as the shelf before which he was standing dipped again and a shiny new Geig fell out.

Then Ron turned his attention to the large doors, which also showed in the screen.

The phone rang again. Gar listened for a moment, then said into the phone:

"I'm sure of it, sir. Most unusual. Are you going to bring him in?"

The smile of anticipation that appeared on his face indicated the answer from the other end. As he dropped the phone a second *whish* indicated the arrival of another tube. This time it was the daily paper.

A third *whish* brought his lunch from the kitchen tube. Gar carried the lunch and the paper to his desk and relaxed.

The paper was mostly comics. The front page carried nothing but news, however. The transpacific bores were only eight hundred miles apart now. Mesmer had solved the gene pattern of the cantaloupe, whatever that was, and figured out a series of crosses of the melon and cucumber groups that would create it.

Radiation seepage had been detected in the Montana area. That meant that the source of entry would have to be found in the automatically sealed off section, and after it was stopped the section would have to remain in sealed quarantine for two years to see if any particles had entered. Too bad. Copper was the big need, always.

Grange's new composition would be heard on the seven-hundred band at eight o'clock. Gar made a mental note to listen to it. It was reputed to be very good. He liked all of Grange's music anyway.

Nothing much in the news. Gar turned to the comics and bit into a sandwich. He didn't care much for liverwurst, so hastily opened his thermos of coffee and poured a cup to drink with it.

WHILE he read he kept an eye on the panel view-screen. The other eye, figuratively speaking, read the comic strips. To Gar comics were literature, romance, and adventure. The highest expression of man's imagination.

His favorite character was Xan, the cosmic doodlebug, who, in fiction, had formed the earth by collecting the dust and debris of space and shaping it into a ball. Xan was a loveable sincere stumblebum. He had fallen in love with a human girl and was making pathetically grandiose plans to roll her up in a planet-sized ball of her own. However, he was stymied for the present by the fact that it was against the law for him to bore to the earth's sur-

face without a license.

For over a week now Xan had been getting the old runaround, being sent from one department to another to get a license to bore a hole. Since he traveled through the solid earth by eating the rock in his way, digesting it, and excreting it as a firm, impenetrable lining to the passage he made, he unwittingly went in the directions and to the places that his human friends wanted opened up. When he got there he inevitably received the answer, "No, Xan. We don't have the authority to issue you a license to bore to the surface. But we CAN issue you a license to bore through to such and such location, where, we feel quite sure, they CAN issue you a license to bore to the surface."

And Xan, his huge, worm-like body busy day and night boring, boring, boring, spurred on by the hope of getting a license, directed by his laughing human friends with fictitious licenses to bore in certain places, thwarted by insistent protests that it's "against the law" when he wandered off his course, loved a girl whom he could never see because he had no eyes. He loved her because her thoughts were beautiful to him, and in his mind's eye he imagined her to be a cute "little" cosmic doodlebug, a wee hundred or so feet long, and a mere wisp of an eight or ten feet thick, with the very daintiest of retractible legs, and the most luscious of rock-wrecking lips.

RON examined the huge doors to the Opening, his new Geig with its strange, delightful smell clutched firmly in his hand. He was being very foolish, he knew. Darkness would come long before he could get back to the buildings and their protection from Geig storms, even as it was. And yet his curiosity made him linger.

Then, just as he was turning to leave, the small door opened and a giant stepped out, enclosed in a shining, transparent bubble. He towered at least two feet above Ron's four-foot figure. In his blue eyes lights danced merrily. Instinctively Ron liked him and trusted him.

"Come inside, son," the giant said in a deep, booming voice. Something stirred deep within the soul of Ron. He had never before heard such a deep, rich voice. Normal human voices to him were the high, shrill voices of boys who died of old age in their middle teens, years before their voices could change in timbre. Yet some racial memory, some instinct, coupled with subconscious feelings of loneliness and longing for the strong adult protection and love that he and his fellows had never had, welled up within him. He dropped to his knees, not knowing why, and bowed his head.

Betty, Amy, and Mary, their eyes round and large with awe, anxiously looked at one another for mutual guidance, then followed Ron's example.

The giant, tears glistening in his eyes, stooped down until his head was even with Ron's. He reached out a cellophane-encased hand and gently lifted Ron's head, smiling at him.

"You don't need to do that, boy," the giant said. "I'm not a god. I'm just your big brother."

Ron thought this over. Suddenly he grinned.

"Not brother," he answered. "Brothers always fight."

Ron rose to his feet. The first feeling of awe at seeing the legendary giant was passing, and his curiosity was reasserting itself.

The open doorway promised adventure and mystery, and the giant's words, spoken when he had first stepped out of the Opening, finally pene-

trated.

Motioning his wives to follow him, Ron stepped past the giant and entered the Opening, that mysterious place which legend, handed down from generation to generation by word of mouth, pictured as the home of the giant.

Inside, a long, uniform tunnel stretched endlessly in both directions, to the right and to the left as Ron stood with his back to the door.

Directly in front of him was a large thing, divided into sections. The giant closed the door and motioned Ron and his three wives to step into the thing. The girls waited until Ron had stepped in and examined this strange object. Nothing happened, so they timidly joined him.

The giant stepped into the end section and sat down. He looked back and motioned the four to also sit. When they were seated he pressed a stud and the strange thing began to glide swiftly along the passage.

Ron had never seen anything move except living creatures, and the dust in the street when the wind disturbed it. This was magic! He didn't liken it to the magic of the needle in the Geig which could tell him when the Geig storm came, because that was not magic. That was something everyone knew and used, although no one had ever wondered how a needle could tell such things.

This was something different. There was no feeling of movement, yet the walls and the road slipped by many times faster than they would at a fast run. He had barely time to get over his first instinctive fright when the thing stopped.

The giant said, "This is a car," and climbed out. The car had stopped beside a door in the passage wall. He opened this and stood aside for Ron to enter. Ron was over his fright. Com-

mon sense told him he had nothing to fear.

HE ENTERED a large room in which there were many of the giants. One who seemed to be the leader stepped forward and said, "My name is Oliver."

"Mine's Ron," Ron answered. "And this is Amy, this Betty, and Mary." He pointed proudly at his oldest baby and said, "This is my son, John."

Oliver bowed gravely. He knew these child people and their customs quite well, since he had spent a good part of his life studying them with various instruments. He knew that they never shook hands, and that a handshake would mean nothing to them. He also knew that Ron had not introduced the other baby because it had not yet been named. He knew by the way Amy stood confidently beside Ron while the other two girls stood a little to the side that Amy was his only accepted wife.

He also knew they must have a terrific odor, but his cellophane covering saved him from this, although its purpose was to shield his body from any contact with radioactive isotopes which he knew were being thrown off with every breath the five surface humans expelled. When he left this sealed section of the upper tunnels his transparent covering would be washed thoroughly before he entered the main section. Every square inch of it would be scanned by a super Geiger counter which could register the presence of half a dozen radioactive atoms.

"We invited you to come in for the night," he said in a reassuring tone. "It's too far back to the city for you to get there tonight."

Ron said nothing, but gave a boyish grin to show that he had heard.

"When you leave we will give you

some things to take with you," Oliver went on. "But we would like to know why you brought your Geig when it is still good?"

"I don't know," Ron said. "I didn't believe the legends and wanted to find out if they were true."

"Are you satisfied?" asked Oliver.

"Yes," Ron said slowly. "Except—will I come here when I die if I'm good?"

"Well, now," Oliver said, laughing, "If that's what you believe, I wouldn't be surprised if you do."

One of the other men now spoke up.

"How would you like to stay here and live with us giants?"

"Gee," Ron exclaimed. "I—I don't know. Would I grow up to be a big giant too?"

"That's hard to tell," the man replied. "You might not like it. You couldn't get any roaches down here to eat. You would have to eat what we do. It might make you sick." He smiled.

"It might be worth it," Ron said. "Back in the city there is only catching roaches and watching out for Geig storms. I think I'd like it!"

OLIVER BERG sat at his desk, fountain pen in hand, filling out a report. It had been three months now since Ron and the three girls had come.

In that three months Ron's adjustment had been very poor. The report told the story. Appetite—very poor. Radioactivity—lessening. Mental state—strained. Homesick.

If only something could be found that would absorb Ron's interest. Something *must* be found, or Oliver would have to let him go. Back to the satisfying thrill of catching a cockroach three times each day. Back to the all-purpose food that Ron had lapped from the filth of the street a few hours after

he was born, and tore with his baby teeth when he was only six weeks old. Terrible as such a life might seem to Oliver, raised in the comforts and science of the underground cities, they were home, mother's cooking and life to Ron.

"It's so hopeless and tragic!" Oliver muttered. As president of the Humanitarian Society he had fought for a program to rescue and rehabilitate the remnants of the race left on the surface for the past twenty years.

Twenty years! The people then, the little children who had to be grown people and raise families when they should be just starting to school, those little people that had lived above when he started his fight for them were all dead now. A new generation had replaced them as they died, one by one, of old age at the age of fifteen!

At the beginning, when the chosen few millions had quietly gone underground, leaving the unsuspecting billions on the surface to their fate, there had been too many to accommodate in the living space carved out of solid rock, deep under the surface, by atom-powered boring machines.

Now there were not too many! But with the problem of numbers solved by the increasingly harsh environment man had unwittingly loosed upon his children's children, a new problem had arisen. The racial one. Weeding out of all those who could not fit the new conditions, speeding up of the generations until they sped from the cradle to the grave at two, three, then four times the speed at which they should, had resulted in a different race that bred true. A race which was ready for reproduction and the responsibilities of adulthood when only six or seven, even when they were taken below the surface away from the environment that had been responsible.

Richard Crane, president of Michigan University, under the lake, had stated the case only too accurately. He had said,

"The question is not whether we should save those now living on the surface. The question is only partly whether we *could* return them, as a race, to the parent race; and that is doubtful indeed. The question, mainly, is whether we should permit our noble and just humanitarian instincts to preserve a race which can only be a constant threat and sore spot to our own children. A race whose individuals die of old age before they can possibly learn anything other than the most elementary of subjects. A race whose members could only fit into our economy in a menial capacity because they haven't time to become specialists. A race which would inevitably resent its place in the scheme of things and revolt.

"Our great nation was founded," he said, "on the principle that all men are created equal. Let's analyze what that means. If we force ourselves to allow the race on the surface to die out, then a century from now ALL children will be born equal, with an equal life expectancy and equal opportunities. If we give in to our pity for those left to the mercies of the surface environment, then a good part of those children born a century from now will have a life expectancy too short for anything except reproduction. Logic tells us which course we should take."

Oliver had answered him with the inevitable replies; that the surface race could be brought below and segregated into colonies by themselves, with teachers and leaders sent into their colonies to guide and aid them, that eventually they might again become normal. But the arguments were weak, and he knew it as he made them.

IT was not as though there really were *two* races. There was only one race, and a part of it had become a misfit. It was the old problem of sterilization of the mentally defective to prevent them from having children, in a new form. It was based on the premise that you can't murder a child that hasn't been conceived.

There had been movements that advocated a systematic program of sterilization of the surface people. There had been a movement that advocated stopping of manufacture of Geiger counters for the surface people, so that environment would do its work of extermination quicker. These movements fought without success, while the little Johns were born to grow up to be Rons before their time, squatting at sewer holes, catching cockroaches so that their infant wives could bear children. And in fifty years, unless the surface race could make further changes so that a two-year-old could reproduce, they would be gone from the face of the earth.

Oliver was no longer fighting to save the race on the surface. He was fighting to save just one boy. He loved Ron as a father loves a son. Ron's quick, mischievous smile, his curiosity, so rare now in surface people, and his unusually high intelligence, had won him a place in the hearts of most of the people who had seen him.

And yet, in his heart Oliver knew that Ron would be much happier back on his own corner in the Chicago loop, king in his own little world, killing three giant roaches each day with an eye on his Geig while he dismantled the insect so that his kingdom could eat.

What did he have to replace it? Perhaps five extra years of life. Or five less, if he didn't survive on other foods then the one he had always lived on. And what of his children. Should they

be sterilized? And what activities could be found for Ron to replace his cockroach hunting?

AND WHAT WOULD BE RON'S REACTION WHEN HE DISCOVERED THAT THE GIANTS WERE LIKE THE FREAKS THAT WERE TOSSED DOWN THE HOLES ON THE SURFACE? Ron didn't know yet that the giants were born with their eyes closed, and that, according to his standards, they were still helpless when they should be running around and looking out for themselves.

It was a hopeless problem. Oliver sighed deeply and returned to his report blank.

IN spite of Oliver's gloomy thoughts, Ron was thoroughly enjoying himself. To be sure, he often thought of the city and felt homesick for it. But he knew that if he insisted he would be allowed to go back. They had told him that several times. He wasn't a prisoner.

The queer-tasting foods often made him sick, and the milky fluid they provided for his babies was very weak, but it was provided in huge quantities so that the babies were never hungry. He didn't mind getting sick except when he couldn't keep the food down. And there were so many fascinating things to see and learn.

Moreover, with the problem of food and Geig storms solved, he was thinking seriously of returning to the city and bringing back several more wives. As soon as he thought the opportunity to broach the subject just right he intended to do so.

He was confined in a large room with one wall made of glass. The giants came and talked with him on the other side of the glass. After he had been there several days they brought him a cellophane covering. He put it on and was

taken through a room where water washed all over his suit. Then they took him on a long journey in a fairyland that beggared description.

Miles and miles of roads. He saw and heard things beyond imagination. Things that were flat and smooth to the touch—television screens, they were called—seemed to be living, solid parts of the world. Most marvelous of all, he actually saw himself as he stood outside the opening when he first came. He saw himself meet the giant for the first time. Newsreel, they called it.

Nothing seemed impossible to these giants! And Ron had grown used to miracles. He had even grown to expect them. He and the three girls spent hours each day exploring the strange things that split open in thin layers. Books, they were called. There were queer, fascinating little figures in the books that could say things that the giants understood, and claimed *he* could understand, too, if he wanted to learn. Already he could recognize several of these little figures and name them. But the most fascinating thing about books was the pages that were like the television screens, only the world they displayed didn't move.

And the pencil! Ron, Amy, Betty, and Mary spent hours each day making marks on paper. Marks that awed them even more than those in the book, for those in the books were made by the giants who could do anything, while those that the pencils left were made by them, which proved they were akin to the giants!

Ron's adult dignity would have been wounded to the quick if he had known that these marvels were merely the equipment given to kindergarten children. He would readily have admitted that he could never hope to equal even the least of the giants in wisdom and ability to perform magic, but would

have denied hotly that he was subnormal.

Human values always seem absolute, but are forever relative. The highest pinnacle of genius of one generation of man becomes the study of school children in the next. The accomplishments of the outstanding men of one period soon become everyday commonplaces. Abilities considered rare in one century become common in the next.

The surface man of 2196 A.D. tossed his "freak" offspring to the cockroaches and newts and drove out its mother to fend for herself because the "freak" if allowed to live, would be completely helpless for a third of its lifetime. The "cave" man was permitting the surface man to die out because he could not live long enough to learn more than the bare rudiments of civilized society.

OLIVER and many of the other giants knew these problems and their inconsistencies. The guilt of their ancestors, who left most of the race to a horrible fate so that the seed of the race could live, to again people the Earth in that far-off day, two thousand years away, when the Geig storms would be no more, weighed heavily on their spirits.

It didn't matter that no other course could possibly have ensured the preservation of the race. It was wrong to steal quietly into the depths of the earth and safety, without even warning those left behind of their inevitable fate. But of what use would it have been to warn them? Where could they go?

Would they have passively let a few steal into the earth so that their children would live, while their own would die a horrible death in generations to come? Do people in a burning building stand quietly, letting the flames lick at their clothing and sear their flesh so

that others no better than they will have room to walk comfortably to safety? If they do they are brave and worthy to live, while the selfish few who escape should die in their place! A dilemma!

Would part of the race have accepted sterilization so that there would BE no children to face the horrible future, while permitting a selected few to go below and sire the future man? Would *you*?

Who were the men, back in nineteen forty-seven, who appointed themselves gods of the destiny of man? Who decided what part of the race was to be preserved? Who made the decision to leave the rest of mankind in ignorance of its fate, to breed children whose descendants would squat above sewer openings in dead cities and cunningly snap the insects whose equally cunning ancestors had lived on the refuse of man's dinner table? And why did this have to be? Why? WHY?

Let's leave for a time the story of Ron—Ron, with his quick, loveable grin, and the proud smile on his seven-year-old face when he introduced his son, John, to the giants, those normal descendants of ours. Let's leave the story of Amy, and Betty, and of Mary, that pretty, five-year-old girl who ran after Ron to become his wife and bear him children—and die at fifteen because the scar tissue in her lungs would produce oxygen starvation and the delicate membranes of the walls of her body cells and blood vessels would become too thick to allow the waste products of metabolism to escape.

Ron and his wives are happy with their pencils, making scratches on paper that delight and mystify them. The suffering they experience when the food the giants give them does not set well on their stomachs cannot compare with the suffering of the soul of Oliver, with

his knowledge of the past and of the future to come, when the descendants of Ron—his last descendants—are burned through and through by the lethal intensity of gamma rays from the air they breathe.

Maybe Ron will stay with the giants and learn to read. More likely he will tire of the magic of the giants and return to the hole in the street, down on the loop in Chicago, where he can catch the wary cockroach and sink his teeth into the white, raw, insect meat that his body craves, to be king of his own little world, and die.

Let's go back. Back to nineteen forty-seven when it all began! Let's look at those who DARED to decide the destiny of the race, and said,

"You, and you, and you, can go below and sire the children who will eventually be able to come back up," and who said, "You, and you, and you, and all of *you*, can stay, and sire children who will live on the filth in the sewers and die with their flesh falling off in white, lifeless chunks, or of old age when they are yet children."

What could have happened that made such decisions necessary? Was it the result of some diabolical scheme of a madman, bent on conquering the world? Or was it some mistake somebody made? Something overlooked until it was too late? Some oversight?

Let's go back and see.

PART TWO

CHAPTER I

ALEX TOPANOV dropped the much-worn, yellow pencil from tired, numb fingers. For several minutes his eyes rested on the last of the many sheets covered with figures and scribbling that littered his desk. As he looked, his face seemed to age

visibly.

Finally he rose and walked slowly over to the window that overlooked a large part of the campus; but he did not look at the beauty of the flowers and the smooth green lawn, nor at the almost fragile beauty of architecture that was embodied in the library building with its tower, set in a triangle of buildings whose laced granite windows swept almost from the ground upward for seventy feet. His eyes rather sought the sky above and beyond the tower.

They seemed to concentrate on something that was hidden in the calm, blue, almost holy purity of the heavens, and in the filmy white clouds that floated lazily in that sea of blue.

His eyes held an infinite regret and a sadness at the realization that he was seeing something that someday no man would see again.

He alone, in all the world, knew that. The realization that he must tell the world caused his shoulders to sag and his head to drop on his chest.

It was all there on paper, on his desk. He had gone over it too many times for there to be any possibility of a mistake. The known value of the atmosphere and its contents, the total volume of water in the oceans and rivers and lakes, and the rates and half-lives of the substances involved. There was no getting around it and no way to undo it.

As he stood there, head bowed, he remembered a story he had read years before of a prisoner of war on a desert, who had been condemned to death by his captors. Having been granted one last request before the spears would run through him, he had asked for a glass of water.

When it had come he had looked fearfully around at the enemy soldiers. The captain had said.

"Do not fear that my men will slay you before you drink. You have my

word as a soldier that none shall harm you until you have drunk every last drop of water in that glass."

"Your word?" asked the prisoner; and as the captain nodded his head the prisoner tipped the glass, spilling the water onto the hot desert sands. Then, smiling, he had said, "If you can gather the drops of water from the sands of the desert I will willingly drink them, but until you do you cannot kill me without losing your honor." His life was saved.

"It would have been much easier," Alex Topanov said softly to himself, "to have gathered those drops of water and put them back in the glass than it would be for us to undo what we have done."

He pulled himself together with a visible effort and turned back to his desk. Carefully sorting the papers lying there, he put them into a folder and placed it in a pocket of his leather portfolio. He was zipping it shut when the door opened and his daughter, Catherine came in.

She was wearing white shorts with a loose, white blouse. The skin of her long, shapely legs, her arms, and her face was tanned a rich, smooth brown that seemed the darker because of the light color of her hair which hung in loose disorder.

In one hand she held a tennis racket, idly letting it swing at her side. The other hand held the door open as she said.

"Come on, Dad. We'll be late for dinner if you don't hurry."

"There's no hurry," Alex said, his eyes averted to the 'folio as he slowly put it under his arm, hiding the knowledge his eyes would betray if he looked directly at his daughter.

"Yes there is," she replied laughingly. "You know how the housekeeper always goes into a tantrum when

dinner is delayed. And you've put her off schedule twice already this week. The first thing you know she'll be quitting."

"Catherine," Alex said. Something in his voice sobered her.

"What is it, Dad?" she asked.

"Would it all right with you if we went back to Poland?" He spread his hands deprecatingly. "There are lots of nice boys there, too, you know. And I would like to go back home."

"Why, Dad! You old silly!" Catherine exclaimed. "Are you working on some new death-dealing device? The last time you wanted to go back was just before they dropped the bomb on Hiroshima. You *never* want to go back to Poland unless something is troubling you. What is it this time?"

"Oh, nothing," Alex said hastily. "Nothing at all. I just thought—maybe—you might want to go. Why of course there's nothing wrong," he went on in forced merriment. "After the atom bomb what else *could* there be?"

"Nothing *I* could imagine," Catherine dismissed the whole subject. "Here. Let me carry your 'folio. You're getting slower every day."

SHE took his 'folio from under his arm and marched out of the office. Sighing hopelessly, he followed.

In the hall Jerry Chadwick, the young nuclear physicist waited impatiently, his tennis racket pressed to white-sweatered side under his muscular arm, the crease in his gray slacks unspoiled by the two hours of exercise on the tennis court.

"Hurry, Dr. Topanov, or you will lose your cook," he greeted Alex, a broad smile on his clean cut face. The neckless, short-sleeved sweater set off his head and shoulders to good advantage.

"Hello, Jerry," Alex said in a tired

voice.

"Catherine almost beat me today," Jerry said as the three walked down the hall to the exit.

"What do you mean, almost," Catherine said indignantly. "I won one set and we had to play over for you to win the second. If we had had time to play a third I would have won, easy!" She wrinkled her nose at him.

"Jerry," Alex said soberly as they descended the broad steps at the front of the building to the walk that led across the campus. "Will you go fishing with me tomorrow?"

"Yes," Jerry answered pleased that Dr. Topanov would want to go fishing with him.

"All right. Be over at the house about five, then, so we can get an early start."

"Will we take a lunch?" asked Catherine.

"You're not going, Catherine," Alex said after some hesitation. "I just want to relax with no one along but Jerry."

"Well, I am, too," Catherine objected, pouting.

Alex chuckled. "Go a h e a d and pout," he teased. "You're left out in the cold on this trip."

"I think you're a couple of meanies," Catherine exclaimed, but there was a thoughtful look in his eyes. "Something's up," she thought to herself. "I'll worm it out of Jerry when they get back."

"How's Olly coming with his book?" Alex asked Jerry, changing the subject hastily.

"Too well, if you ask me," Jerry answered, a worried frown appearing on his face. "He spends most of his time on it. When he isn't writing he's in his lab conducting experiments. He has one whole section of his lab piled with what he calls environment chambers now. And each one is working."

"He still thinks he can find the first life form?" Alex asked wonderingly.

"He not only thinks so," Alex said emphatically, "But he is positive of it! That's what those environment chambers are for. But I think he's on the wrong track."

"Hmm," Alex said softly.

The three had come to the parking lot and were climbing into Jerry's red Buick convertible.

When they were seated Alex said, "Suppose we stop at Olly's lab and see if he will join us for dinner. I'd like to listen to his ideas some more."

"Okay," Jerry answered, "but I doubt if he will tear himself away from his work long enough to eat any more than a hasty meal at the corner cafe."

Jerry brought the car to a stop at a red light. Alex signalled the newsboy on the corner and bought a paper. As the car again went into motion he spread out the paper and glanced over the headlines.

HIS eyes came to rest on the item about the detection of radioactives from the Bikini explosion over Los Angeles. The report said that they had been carried in by the wind, but would have to be a hundred times stronger to have any effect on life.

This eyes dwelt broodingly on the news item, while Catherine and Jerry engaged in small talk, unheeded by him. After a few moments Jerry brought the car to a stop at the curb and hopped out.

Five minutes later he returned, followed by his brother, Olly. The resemblance between the two began and stopped with the general structure of the head; the same forehead and hair, the same cheekbones and the same cut of chin and jaw line. But there the resemblance stopped. Where Jerry was tanned, and his expression that of habi-

tual enjoyment of life, Olly's pale face pictured only the suffering and introverted intentness of expression of the physically inferior.

As he crossed the sidewalk to the car his left arm was drawn up against his chest, the withered hand bent sharply at the wrist. His right hand gripped a cane which he used to help his dragging right leg along. His unpressed suit had cigarette ashes liberally spotted against its dark surface.

His half-closed eyes came to rest on Catherine and stayed there as he climbed into the car. Alex had slipped into the back seat while Jerry was gone, and Olly took his place beside Catherine.

"Hello, Olly," Alex and Catherine spoke together.

"Hello," Olly smiled at each in turn, then settled on Catherine again. He had never dared to ask her for a date. His only moments with her were like these, when he was included on something with his brother. He didn't mind too much. He knew that it was best this way. Catherine could never look at him the same way she did his brother. All there was for him in life was his work; but sometimes it was hard to reconcile himself to being a cripple.

Catherine's eyes took in the lines of fatigue on his fine, ascetic face.

"You've been working too hard, Olly," she said softly.

He shrugged his right shoulder and smiled resignedly.

"What else is there for me to do," he said. "Should I drag myself around a tennis court?" He glanced at the two rackets on the floor of the car.

"No," Catherine admitted, "but you could take a book and go sit on the campus in the sun." She regretted her words as they came from her lips. Biting her lip she turned to Jerry.

"Don't forget—" she stopped. She

had been about to remind him of their date to play a double with some friends on the uptown tennis courts Sunday, but somehow everything she said when Olly was around seemed to hurt him.

"Forget what?" Jerry asked glancing at her briefly and then returning his eyes to the job of driving.

"The latest Bing Crosby record," she went on as if that was what she had been intending to say. "You promised to get it for me when you went down to the record shop."

Jerry kept his eyes straight ahead and said, "Okay." Not having made any such promise he knew what Catherine had been thinking.

"Damn Olly," he thought to himself bitterly. "If there were only some way to get him out of his self-pity and feeling of inferiority!" He was really a fine brother. Before the motorcycle accident that had injured his spine he had been the better of the two. But since then he had grown more and more to feel himself unwanted and a burden on the world. He would have to snap out of it somehow or pretty soon he *would* be a burden on any company he was in.

JERRY had picked Alex up at six A.M., and they had reached the river a little before seven thirty. Alex had brought along his 'folio. Catherine had been up and had still wanted to go along. She had accused her father of being childish when he insisted on taking his 'folio along. He had been adamant on all counts. The only part of Catherine he permitted to come was the lunch she had prepared for them in the hopes that that would make her father relent.

The argument over the 'folio had created a mild curiosity in Jerry. Only mild because he knew that Alex had been working on something lately, and

might want to do some thinking on it in the peaceful atmosphere of the river.

So it was with some surprise that he heard Alex say, after their early lunch.

"Jerry, my boy, I want you to go over some work I've been doing and see if I've made any mistakes. But before you look at it I want you to promise that you will not say a word about any of it to any one at all. No one."

"Why, of course, Dr. Topanov. You know I wouldn't do a thing like that," Jerry answered with considerable surprise and hurt.

"I'm sorry," Alex apologized, sensing Jerry's hurt. "I didn't mean to imply anything. You will see after you read these papers that there was a very good reason. But I want to impress on you that you *must* keep what you learn a secret. You may not think so after you read them. You may think it your duty to humanity to rush out and inform the world. I felt that, too, at first. But I have come to the conclusion that it will take better heads than yours or mine to decide what is best to do with what I've discovered."

He opened his 'folio and slowly took out the papers he had worked on for the past few days. Wordlessly he handed them to Jerry. Then he lay back and closed his eyes wearily as Jerry began to study the equations and written words on the unglazed yellow sheets of paper.

It took Jerry a half-hour to skim through them. Then, a worried, puzzled frown on his face, he took out his pencil and began to check the mathematical work.

He looked up once and said.

"These figures are what you had the whole department working on two weeks ago, aren't they?"

Alex nodded without opening his eyes or changing his relaxed position.

Finally, Jerry laid the papers and his pencil on the river bank beside him and stood up, flexing his back to get the stiffness out of it. Then he squatted down, picked up a pebble and frowningly threw it into the stream.

In his mind's eye he saw the waters of this river flowing to the ocean, evaporating in the rays of the sun and drifting inland as fleecy clouds, to fall again on the mountain side and drain into the river, and once more drift back to the ocean.

It was an endless cycle; the cycle that made life possible on the earth. Now, as he watched, he saw that it had suddenly become something sinister—a death cycle that would forever END life.

HE KNEW only too well that the conclusions Dr. Topanov had reached were correct. They should have been obvious from the day the Curies had first isolated radium. But they had been overlooked. Jerry smiled wryly. It was a human failing to overlook certain things. A human carried his thinking up to a point where he had his desired objective and then dropped it.

One city dumps its sewage into a river that passes through another city. That city pumps its drinking water from the river, and has epidemics of disease. Even after the germ was proven to be the cause of disease cities fought against laws protecting the purity of streams because it meant spending money for sewage disposal plants, and money for chlorination plants to purify the drinking water. People, including him and Dr. Topanov and Roosevelt and Einstein, never thought of everything. They always stopped thinking at the point where they had what they wanted.

And now—Jerry raised his eyes to

the blue sky showing through the trees. His eyes held the same look that Alex's had held the day before as he looked through his office window at that same sky. A hurt, helpless, hopeless resignation. A resignation that knew nothing could be done.

It was a look that thousands of pairs of eyes would hold soon. Millions.

Alex looked silently at the back of Jerry's upraised head and knew what thoughts were running through his mind.

"It's a terrible thing to contemplate, isn't it, Jerry," he said softly.

"Damn it, Alex," Jerry said, throwing another pebble in the stream. "Isn't there *some* way of undoing it?" And even as he asked he knew there wasn't.

"Maybe we could evacuate the planet and settle on another," he finally suggested.

"Where?" asked Alex. "You can see now that the same thing must have happened to Venus. Nothing else could explain her unexplainable blanket of clouds that hides her surface. Mars? Maybe it happened there. That would account for her loss of atmosphere and water. One of the moons of the larger planets? Maybe. But we don't even have *one* ship that could leave the earth yet, let alone enough to evacuate the whole population in three centuries."

A horribly sick feeling was growing in Jerry. He saw himself marrying Catherine and having children, and the children growing up and marrying. He saw the inevitable consequences; his descendants in three centuries facing the merciless sky, to be burned and cooked by the Gamma radiations that poured out of the atmosphere in ever more lethal concentrations.

No! He couldn't let that happen! And yet he must not tell anyone about this. He knew that, too. If he told

one person that person would tell others. Eventually the whole world would know. And then there would be panic, riots—and if some refuge from the coming cataclysms were found, the millions would trample themselves to death in a mad struggle to be the ones saved from extinction!

The problem was too great for one person, or two. And it could not be kept secret.

"What do you plan on doing, sir?" Jerry asked in a subdued voice.

"Now that you have verified my conclusions, Jerry," Dr. Topanov said in a firm voice, "when we get back to town I plan to wire the president for a consultation. I'll lay the problem squarely in his lap. Then *he* can decide."

"That's the best thing, I guess," Jerry said. "Should we go? Somehow I don't feel like fishing any more."

Without another word the two men, one young and with most of life yet before him, the other old and bent, with all of life behind him, rose and climbed up the bank. With them went the secret, known now to TWO men.

IN SEATTLE the evening editions of the papers were rolling out of the presses. People were glancing at the clocks, impatient to leave their work and hurry home. In thousands of hamburger joints people were idly listening to the voice of Bing Crosby, or the funny music of Spike Jones, from the juke boxes. And none of them knew.

In three centuries some of these places would still be standing. But there would not be so much as a fly buzzing around a customer—nor any customer. There wouldn't be even a weed growing in the vacant lot by the drugstore, nor an ant crawling across the sidewalk.

And five hundred years from now some space traveler, coming near the

solar system, would make notations in his log book.

"Second and third planets covered by dense cloud layers. Periods of revolutions unknown because no surface landmarks are visible through the clouds."

CHAPTER II

ALEX and Jerry stopped at the telegraph office on the way back home, and sent a telegram. It read:

"Secretary: Must see president at once. Urgent matter. Most urgent. Wire or call. Also arrange travel priorities. Dr. Alex Topanov."

Since Alex's work had been outstanding in the construction of the atom bomb, and it was so well-known in the President's secretarial circle, there was no question but what the telegram would be acted on immediately.

Neither man spoke as they left the telegraph office. Finally, the silence still unbroken, Jerry pulled the car to a stop before Alex's house.

Catherine saw them pull up, and ran down the sidewalk to meet them.

"How was fishing?" she asked, her eyes looking at them with a shrewd, penetrating analysis.

"We caught six nice rainbows," Jerry grinned. "But your father got four of them. He seems to read their minds and know just the flick of the wrist that will make the bait most enticing to them."

"I know it," Catherine said, laughingly. "I've seen him operate. He should write a book on fish psychology."

"Maybe I will, some day," Alex joined in. "A man has not truly become a philosopher until he understands the psychology of a rainbow trout."

"Do you mean a salesman could

hook more prospects if he knew how to hook a fish?" asked Jerry.

"I venture to say he could," Alex said. "After all, the technique is much the same in both cases."

Alex had been unloading his equipment. Jerry remained in the driver's seat, and as the three laughed at Alex's remark, Jerry slipped into low gear, and said.

"Well, I'll be running along. See y'all later."

"Jerry!" Catherine shouted. But the car sped down the street, with no sign that Jerry had heard. Catherine watched the fast vanishing rear bumper, puzzled indignation in her clear blue eyes.

"Well! I like that!" she exclaimed. Then turning indignantly to her father. "Dad. What have you said to Jerry that would make him act like that?"

"Nothing," Alex said, puzzled. "I'll have a talk with him tomorrow and find out what's wrong."

"No you won't," Catherine exclaimed. "I won't have you meddling in my affairs. If I can't handle them myself I certainly don't want you playing nursemaid."

She angrily picked up the wicker fishing basket with the trout in it and stamped to the house. Alex followed her, bewildered by her outburst.

MEANWHILE Jerry drove the car in the direction of his and Olly's apartment. His mind was in a turmoil of indecision. He had "cut" Catherine on the impulse of the moment, then regretted it at once. He should have gone on as if nothing were wrong. Now he would meet an angry, demanding Catherine the next time he saw her, if he knew anything about her at all, and he could not explain his action without giving away the secret that was not his to divulge.

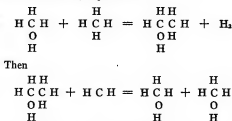
He parked the car in the garage, and found Olly in the apartment, for a change, a triumphant look on his face.

"Jerry," Olly exclaimed, when Jerry entered the door. "I've found it at last."

"What?" Jerry asked absently, tossing his hat on the bed and starting to unlace his boots.

"The right environment for development of the first life form," Olly cried excitedly. "If you remember the Graham Theory of the origin of life, you recall that he said the first life form must be either a hydroxycarbon or a hydrocarbon molecule of the repeating variety. That is, it builds up in such a way that each section is like every other section in it, and that when it gets so long it breaks off, so that the two segments go on building up independently."*

* In an atmosphere of methane gas, hydrogen and steam, with no other substances present, introduce a single molecule of methyl alcohol, or methanol. Under certain conditions it might be possible that the reaction would be as pictured in the following equations.



If, further, the production of methanol from methane were practically impossible when the methanol is not present, and it is produced easily when methanol is already present, the mixture of methane gas and water vapor may be likened to a simple food, and the methanol molecule to a simple life form which reproduces in it. If a mixture of ethyl alcohol, CP, and water, CP, can be subjected to temperatures or rays or catalysts that make it break down into methyl alcohol, the case is proven.

The same principle of a substance being necessary for the production of more of the same substance in a given medium, applied over the whole field of organic chemistry, would account completely for life.

—Nature of the Universe, by R. P. Graham.
(not yet published)

"Yes, I know all that," Jerry said absently. "He couldn't prove it, because, although it was obvious which hydrocarbons should be the logical ancestors of all living substances, he wasn't able to discover the right conditions—" A look of startled surprise appeared on his face.

"Olly!" he exclaimed. "Don't tell me that you have actually discovered THE environment and that you have ordinary methyl alcohol reproducing its kind!"

Olly nodded, grinning delightedly.

"Well I'll be darned," Jerry exclaimed. "Now you'll be the next Nobel prize winner or I'll eat my shirt!"

A shadow passed over his face. The memory of what he had learned that day was a dark, stormy cloud hanging over the future. Olly had found the proof that life is a perfectly natural type-reaction in chemistry, just like all other chemical reactions except that the reaction was built upon the same kind of molecule that would be produced as the product.

But what difference would it make in three hundred years when there were no more people to know about it? Jerry forced these thoughts out of his mind and followed Olly down the back steps to the laboratory, to see what had been going on.

Olly pointed to two large glass tanks, completely enclosed. Inside each was an identical cloud of steam and glass-encased thermostat.

"In this one," Olly explained, pointing to the one on the right, "there is no alcohol at all. None put in at the start, and not a trace now."

"In this one," he said triumphantly, pointing to the one on the left, "I put in one drop of pure methyl alcohol two weeks ago. Now there are strong traces of alcohol in it. Not only methyl, but ethyl, and several other alcohols, bear-

ing out the broken chain hypothesis!"

"What's the environment?" Jerry asked, now as excited as his brother.

"Just plain carbonated water, CP, and nitrogen. I found that my failure in my first attempts was due to the oxygen I left in the environment chamber. This time I carefully ran carbon dioxide through until all the air was replaced by it. The oxygen had the effect of disrupting the alcohol molecules at boiling temperatures, and killing the experiment."

"Now you can go ahead with your book and have something to back it up," Jerry said, a glad light in his eyes.

"And will it be a honey now!" Olly exclaimed.

THE sound of the phone came down the stairs. Jerry took them two at a time. It might be Dr. Topanov. It was.

"Hello. Jerry?" Alex's voice came over the phone faintly.

"Yes," Jerry replied crisply.

"Uh—Jerry," Alex said with some hesitation. "I got a telegram from Washington. They seem to want us there about something. They didn't say what it was."

From the tone of Alex's voice, Jerry gathered that Catherine was listening, and her father didn't want her to guess that he had requested the interview with the president. He instantly fell in with the deception.

"From Washington?" he exclaimed incredulously. "I wonder what could be up?"

"I'm not sure," Alex went on with evident relief. "It must be important because they have already arranged plane priorities for us to go in the morning. Can you be ready to pick me up and get to the airport before seven-thirty?"

"Yes," Jerry answered. "I'll have

Olly with me. He can bring the car back home when we leave."

"Fine," Alex said. "Oh, just a minute, Jerry. Catherine wants to talk to you."

"Hello, Jerry," Catherine's voice came over the phone almost immediately. "What was the matter with you that you drove off like the devil was after you?"

"Sorry, Catherine," Jerry answered. "I was worried about Olly. But he was all right. And say, Catherine. He's found the right environment to cause methyl alcohol to reproduce, thus proving that it's the first life form, just like Graham predicted!"

"Oh, that's wonderful," Catherine exclaimed. "Now he can announce his discovery and print his book, and make enough money from it to have an income for the rest of his life."

"Isn't it swell," Jerry said enthusiastically.

"I guess you won't be able to keep that tennis date day after tomorrow," Catherine changed the subject. "You'll be in Washington with dad."

"Yeah, that's right," Jerry said. "Well, I'll see you when we get back, Catherine."

"What's the matter with you, Jerry?" Catherine asked, worry in her voice. "You sound so darn formal. If you're going to give me the gate, say so. You don't have to be so tragic and formal about everything."

"No Catherine. You know I love you," Jerry said desperately. "I'm not giving you the gate."

"Something's on your mind?" Catherine suggested. "I know it's something you and Dad talked over while you were fishing. Can't you tell me about it?"

"No," Jerry fell into the trap. "That is, there wasn't anything. At least nothing about you. I mean, it wasn't any-

that had anything to do with us." He pulled out his handkerchief and wiped the perspiration off his forehead.

"Well, I'll let you go now," Catherine said. "But I warn you that I'm going to demand some answers when you and Dad get back. You aren't going to have any secrets from me if I know about it." Then, in a softer voice, "Goodnight, Jerry."

"Goodnight, Cathy," Jerry said, and hung up.

ALEX and Jerry were met at the airport by two young men who looked like college students—except when you looked in their eyes. Then, somehow, you knew that they had killed people, sometime or another, and would do it again with the same matter of factness that a cook in a hash house flips eggs over in a skillet, it it became necessary.

The brightly polished sedan took them quickly to a new-looking apartment building where they found that an apartment had been vacated for them temporarily.

One of the young men said that the President would see them any time they were ready to go. Alex had said to come back in half an hour.

During that half-hour they had freshened up a bit and had a cup of coffee that a midget bell hop had brought up to them on a huge tray after they had phoned down for it. The coffee had been good, but the ice water in its sweating glass pitcher had been much more to the point.

Then the two young men had come back, discreetly knocking at the door. One of them had phoned the White House before they left the apartment.

Alex had been in Washington before, when Roosevelt was alive. Jerry had never been here before. But both were too preoccupied with the coming

meeting to notice anything outside the windows of the smoothly gliding sedan.

At the White House the car pulled silently to a stop at a side entrance and Alex and Jerry found themselves hustled efficiently along corridors. Before they knew it they were standing inside a doorway and the president was rising from his desk, hand outstretched, a broad smile on his face.

"How do you do, Dr. Topanov. I've heard a great deal about you and your work and it's a privilege to meet you personally."

Alex shook the president's hand and introduced Jerry.

Now they were standing there, an uncomfortable silence settling over them. The two young men showed no inclination to leave, and there were two secretaries hovering in the background.

"What's on your mind?" the president asked cheerfully.

Alex looked embarrassed and glanced uncomfortably toward the secretaries and the two young men.

"Could we talk with you alone?" he asked finally.

"Oh, come now," the president laughed. "You don't need to fear that anything said in the presence of these men will ever leave the secrecy of these walls—if it needs to be kept secret."

"Mr. President," Alex said with some heat. "In my judgment what I have to say should be said to you alone at this time. If necessary, Mr. Chadwick can leave the room with your men, and I will submit to stripping and putting on a sheet so that you can be sure I have no weapons on me. I'm an old man, and you are undoubtedly more than a match for me in a hand-to-hand struggle. If you fear for your safety that should more than satisfy you on that score."

The smile on the president's face

vanished abruptly to be replaced by a piercing look as he took in the keyed up tenseness in Alex's figure.

He turned his head toward the secretaries and the two young men and nodded almost imperceptibly. Silently they left the room.

The three men remained motionless for a moment after the door closed behind the departing figures. Then the president returned to his chair behind the presidential desk.

ALEX, his hands trembling, laid his folio on desk and unzipped it, taking out the papers with his fingers on them.

"Mr. President," he said, "Here are the figures to prove what I'm going to say. You can have them gone over by others to verify my results, but they will only find out that I have made no errors in my results, unless it is in the dates.

"You'll see after you hear me why I insisted on your men leaving. This is something to vital and too dangerous for just anybody to know, no matter how close to you he is, nor how sure you are he can be trusted."

Alex smiled worriedly.

"I'm not too sure that even *you* can be trusted with the knowledge, sir. But there is no one else in a position to accomplish what needs to be done, and I couldn't be sure of them either."

"I see that you think you have something of tremendous importance," the president said. "You may be sure that no matter how unbelievable it may sound, I'll give it most serious consideration and not treat it lightly. Go ahead and tell me about it."

"It all hinges," Alex began, "on two things about radio-activity that have heretofore been considered unimportant. Neglecting these two things was an oversight on not only my part, but

that of every nuclear physicist since radio-activity was first discovered. That oversight has **ALREADY CONDEMNED THE HUMAN RACE AND ALL LIFE ON THIS PLANET** to extinction in three hundred years. It may be more or less time than that. That period of grace was arrived at by estimating the amount of air in the atmosphere around the earth and the amount of water in the oceans and rivers and lakes."

Alex talked earnestly for almost an hour. The president listened; at first incredulously, then with dawning realization that here was something beyond belief. A trap that man's blind belief in the fundamental goodness of nature had led him into.

Finally Alex's voice stopped. The quiet murmur of noises from other parts of the building, and noises from the street, filtered into the quiet of the room.

The president stood up and walked over to a window. He stood there, his back to the men in the room, and looked up into the sky. Alex and Jerry knew what he was thinking. They had done the same. And each time they looked the sky seemed bluer and a little more incapable of doing harm than before.

After a while the president turned around, seeming to jerk himself back to the present with a strong effort of will.

"Of course I must have these figures and the facts they are based on checked," he said gravely. "But I realize now, at least as well as both of you do, the importance of keeping this secret for the present."

He sat down again and drummed his fingers on the surface of the desk, thinking.

"The reporters will be quite a problem," he said, more to himself than to Alex and Jerry. "Not an inkling of this must get in the papers. If your facts

hold water we may have to decide to take other nations into the secret, too. Every race and nation should have an equal chance to save itself. There will have to be experts in every field of human endeavor let into the secret. No possibility must be left unexplored."

He jerked his head up and looked at Alex.

"When did you say this would end, so that life on the surface would again be possible?" he asked.

"In two thousand years," Alex said slowly.

CHAPTER III

JOHNNY DAVIS was a specialist in his field. He had climbed to the top by putting two and two together where other reporters could only see disconnected twos. Deep down in his heart he felt that he was the guardian of the four freedoms, the protector of the people's rights, and the champion of the public; the uncoverer of secret governmental activity without equal.

He had gotten to the top by being systematic. A firm believer in knowing what you are looking for, he had often said at dinner parties that a hunter must make up his mind what he wants to hunt before starting out.

"If you are hunting for deer," he had often said, "you never notice a rabbit unless you stumble over it. If you are hunting for rabbits you pass by a deer and think it's a tree."

In his little black book he kept lists of things to look for, in the order of their importance as news. At the top of the list was always a date. He never tore out these lists, and they were remarkable in their picturization from month to month of the things that made news.

Heading the list for some time now, were two quite well-known words; atom

scientists. The fact that they were there at the top of the list indicated why Johnny was tops in his profession. His well ordered mind could give in a definite order the reasons why he considered them special. First, nuclear science was the most interesting news item. Second, atom scientists hadn't done anything for several months to gain the limelight, so any real news from that direction would be fresh. Third, his infallible news instinct told him that the probability of something popping in that direction was quite great. Fourth, the other reporters were asleep there, so anything that he could get would be a scoop—and he had climbed to the top by bringing in a consistent string of scoops during his years as a nationally known reporter.

C.B.D.'s—Candy Bar Delights—the confections that were the "object of my affection" to twenty million of the American public daily, provided him with two-thousand dollars each week to bring in his scoops. He used it sparingly, but judiciously, and, as a result, had many thousands of pairs of eyes and ears all over the world constantly on the alert, hoping to get a little of that money.

Whether they were lucky enough to get any of it during one particular week or not, they always received Johnny's latest order-of-importance list, which was something in itself, since they were all local reporters with ambitions.

Over a hundred of the two thousand dollars each week went for collect telegrams that came into Johnny's office from the members of his world wide, extra-curricular staff of reporters. Another hundred and fifty went to pay the salaries of the three—perhaps the only three girls in the United States who had both the looks and the brains necessary to work for Johnny.

Many an editor of a local paper

would have promptly fired his best reporter if he had known that orders from Johnny's Washington office superseded his own. Yet, quite often, that reporter gaining a minor scoop, not of national importance, because of a tip supplied by Johnny as his agile mind kept in touch with the national and international pulse, sifting and sorting things as they happened, weighing them in the balance, and picking the half-dozen or so items that he broadcast each day, throwing the crumbs to the local editors via their star reporters.

Sometimes Johnny watched a thing develop for weeks before he "broke" it in his broadcasts. Quite often he paid a great deal of attention to something that seemed significant, only to drop it, file it away for future reference when he found it too insignificant for his tastes.

THE telegram from Seattle was one of two hundred and fifty that the three girls had to read and sort. It merely read, "One two seven thirty transcont. Art." The translation was obvious. "Atom scientists, two of them, by seven-thirty plane to Washington," and the name of the star reporter on the P.I., the Seattle morning paper.

A phone call to the local airport disclosed when the plane would arrive, another call ensured that a local reporter would see what took place when they landed; then the girl laid the telegram in the number one, active, basket, with a penciled notation of her calls. Four minutes and twenty seconds on the telegram, then she went to the next one. As simple as that.

The reporter that watched Alex and Jerry meet the two young men and ride off in the shiny sedan with the special license plates on it promptly phoned Johnny's office. Automatically the girl made two marks on that re-

porter's score sheet in the card index, which meant he would receive a check within ten days, and called Johnny.

When Alex and Jerry stepped from the shiny sedan to the corridor that wound up at the president's office, Johnny himself was standing in the outer secretarial office. His keen ears heard the atom scientist's voice, pitched high with emotion, as he said:

"Mr. President, in my judgment what I have to say should be said to you alone at this time."

It had been so inaudible that Johnny was quite sure no one else in the outer office had heard it. He was equally sure of what would happen next, so without waiting for more he left. One can't snoop at keyholes in the White House. What Dr. Topanov would say to the president could be found out later.

Johnny found a phone booth and talked swiftly to one of his "boys" in the press room for several minutes. Then he called his office and made love to the secretary who answered, giving her incidentally a few terse instructions.

He dropped the whole matter from his mind when he dropped the receiver back on the hook. There were more important things to occupy his mind for the present, such as an afternoon cocktail. He could be reached in his regular haunts.

WHEN Alex and Jerry left the president there seemed to be an atmosphere of subdued excitement in the outer office. Outside, the city noises seemed to have taken a higher, almost electric pitch.

One of the two young men, on the way back to the apartment house, told them about it. Russia had called her British and American ambassadors home "for consultation". For several weeks Russia had been putting pressure

on everything at the peace conference. She had vetoed where she could, obstructed where ever possible. Now this.

The buzz of conversation on the streets had a questioning, hysterical tone. Did this mean war? Was it only another episode in a war of nerves? It was anybody's guess.

As Alex and Jerry crossed the lobby to the elevator, snatches of conversation impinged on their consciousness.

"—atom bomb would wipe out the Kremlin within twenty-four hours after they declare war."

"They *have* the atom bomb or they wouldn't dare."

"—be no declaration of war. The first we'll know will be when Washington is bombed."

"What we need is an atom-proof Capitol."

"Yeah. The president ought to get out of the city. We don't have any vice-president."

"It's coming sooner or later, so why not—"

The closing of the elevator door cut it off. Alex sighed heavily as they were lifted at breathtaking speed to the floor of their apartment.

In the apartment Alex said:

"Well, it looks like we'll be in Washington for a couple of weeks, at least. So I think I'll write Catherine before we eat."

He sat down at the writing desk and listlessly picked up the hotel pen.

Jerry sat with one leg hooked over the arm of the most comfortable chair in the apartment and listened, broodingly, to the harsh scraping sound of the pen on paper as Dr. Topanov wrote.

He glanced at his watch. It was four-thirty. The plane trip had been tiring. The stopover at Chicago had been a long one. Some mixup in their priorities. A room had been obtained for them in the Palmer House, but they

had only had four hours sleep before having to rush out to the airport again.

He stood up and said over his shoulder to Alex as he went toward the door,

"Guess I'll go down to the lobby and buy a paper." Alex merely nodded his head to show he had heard, and kept on writing.

THREE days passed slowly. Alex and Jerry had seen the president again the second day. He had asked them questions, then informed them that several experts in various lines were being called in. When asked what he planned to do, the president had been rather hesitant about answering. He seemed worried.

Alex was stretched out in the comfortable chair, his legs resting on another chair that he had pulled up to use as a foot stool. He was reading a magazine.

Jerry had turned on the radio. The program of music ended. There were some commercials. Then the C.B.D. program came on the air. After the standard song commercial, "The object of my affections, is C.B.D. confections, from morn to noon and night," the machine-gun voice of Johnny Davis came on.

The first seven minutes, as usual, were devoted to a rapid-fire series of scoops. Then there was the usual intermission for commercials. The second half of the program was always devoted to Johnny Davis' predictions, most of which usually came true. Jerry and Alex lifted their heads in amazement as Johnny Davis began speaking again.

"Ladies and gentlemen," Johnny's voice rang out over the radio, "I am going to do something I have never done before. I'm going to retract a prediction I made last week. Last Thursday, over this microphone, I predicted that within ten days Russia would recall her

ambassadors to the United States and Great Britain, and that they would *stay* in Russia. I predicted that there would be a declaration of war within a month, and that Russia would announce a Monroe Doctrine for Europe as the *cause* for which she would fight.

"I had good reasons for that prediction. The facts on which I based it were from unimpeachable sources. I say now that prediction would have come true in every particular, just as it has already come true in one respect, with the departure of the Soviet Ambassadors of the United States and England—except for one thing. A new element has entered the picture which did not exist last Thursday.

"So now I predict—that the Soviet Ambassador will return to the United States within thirty days, that there will be no war, and—**THE SOVIET WILL DO AN ABOUT-FACE AND WORK IN CLOSEST HARMONY WITH THE UNITED NATIONS FOR AT LEAST THE REST OF THIS YEAR.**

"I predict—that there will be a meeting of the big three—in Russia—with-in two months.

"I predict—that they will lay the groundwork for the setting up of an international police force, the details to be worked out by a commission, which will convene shortly after the meeting of the big three."

"I predict—that an international police force *will* be set up, and it will be in full operation by next spring."

As the program ended, Jerry said with a chuckle,

"Can't you just see him if he knew?"

"I predict," Jerry said, mocking Johnny's voice, "That in three hundred years there will not be a creature alive on this planet. I predict—that in two thousand years—if there were any life left anywhere—it could live again on

this planet."

Alex laughed mirthlessly.

"There's our secret. But I can just see him! He would consider that the peak of his career—to tell the world what's going to happen and prove it so that no one could doubt."

Both men were silent, thinking of that possibility.

"Think of what would happen," Alex went on, suddenly. "Assuming some refuge can be devised against it, where men could exist for two thousand years, until they could again live like we do now, it would have to be for all or for none! The human is so constituted that there would be too many who would say, 'If I can't see my children safe from what's coming, you can't either.' They wouldn't think of the race, and that they are merely individuals, members of the race, and that it's the race that has to be saved. They would only think of themselves, and that you are no better than they."

"Yes," Jerry agreed, "If all the unselfish people in the world voluntarily relinquished their right to preserve their own children, and stepped aside so that the selfish ones could step in ahead of them, there would still be too many demanding that their children be saved."

"The quickest way to be sure of wars and race extinction would be to let the public know what's coming. And that's what Johnny Davis would do; tell all. Once he found out, nothing would stop him."

"Well," Alex said with relief, "there is no way he can find out. Everything will be done on the quiet. Not an inkling of what is going on behind the scenes will ever reach the papers to draw his attention to us. So we have nothing to worry about."

"That's right," Jerry agreed, and then, as a heartfelt afterthought, "Thank God."

JOHNNY DAVIS stood looking forward, resting on the balls of his feet. His tweed suit looked like it had just come from the tailor who made it, which it had that afternoon. His freshly-shaven features glowed with health as only those who are on top of the world mentally can glow.

His left thumb was hooked in his lower left vest pocket, and his right index finger stabbed at his audience with rapier-like thrusts as he spoke. His audience was the cream of the Washington reporters.

"Look fellas," he said. "There's something on the fire. Something cookin'. I don't know what it is—but we've got to find out."

"My hunch is that it will be the scoop of the century! What have I got to go on? Just this." He paused and his quick eyes darted over his audience.

"We have one of the chief atom scientists of the world come unexpectedly to Washington and go directly to the president. He's met by the president's own boys and Senator so-and-so takes a hurry-up trip home for no reason at all, just to give the scientist a place to stay."

Johnny looked down at his vest, a self-satisfied smile on his lips, at what he was going to say next.

"I'm in the outer office of the president when the boys march Dr. Topanov in to the president's office. I hear him with my own ears order the president to clear the room so he can talk in private. And the president does it! Imagine that! Something private that even the president's personal secretary and the secret service boys are not permitted to listen."

"What could it possibly be?" Johnny spread his hands in a gesture of puzzlement. "Let's put two and two together. Dr. Topanov is an outstanding atom scientist. The field is the youngest on

earth. *Anything* can pop up in it. The atom bomb? Every one dropped is obsolete before it hits the ground."

The assembled reporters chuckled. Johnny grinned, and said, "Pretty good, huh?" Then he frowned to clear his thoughts again.

"What I'm driving at is this; the president is no fool. He's known since early summer that Russia wasn't going to play ball with us. The way Topanov talked he hadn't dropped in to pass the time of day. He gave orders and the president took them without a murmur. So my guess is that Topanov and some of the other key physicists like young Chadwick, who came with him, have been working on something ever since the war, and they've finally got it! What does that mean? It must be something that makes the atom bomb obsolete, at least. Maybe something that can wipe out all of Russia at one blow. What happens? You heard my predictions this evening on the radio. If you didn't listen in you're fired.

"I figure that in a few days now—about the time the Russian Ambassador gets home, the American Ambassador will quietly walk up the steps at the Kremlin and hand proof in black and white that the minute Russia declares war we will wipe her out completely. The minute I get a cablegram from Moscow with the word, Caviar, in it I'll know that's happened.

"Then Russia will have to be good until she figures out what to do next. My guess is that she will be *very* good."

"Well, isn't that good?" asked one of the reporters.

"Sure that's good," Johnny replied emphatically. "But wait till you see what comes next. What happens? The president isn't going to be elected next term. Even he knows that. The unions are out to get him. But good. So what will he do? My guess is that

while he has the chance he'll see that he gets the job of CHIEF OF THE INTERNATIONAL POLICE FORCE. The only way he can do that is to force it on the world with the threat of total destruction by this new weapon the atom scientists have cooked up, and force the commission to make him chief. Then to hell with the job of president. He can tell the *new* president what to *do*!"

JOHNNY DAVIS was breathing hard with emotion now. He had kept to himself most of the conclusions he had drawn on world affairs for the past year. They were being borne out now. He went on.

"What's been happening during the past few months. Molotov is smart, but not as smart as the American and British diplomats. Do you think it was an accident that Molotov got a seat in the second row behind the British and American delegates not long ago? Do you think that *any* of those subtle insults to the Soviet Union that have occurred during the past few months have been—oversights?

"Almost from the day the president took office there have been subtle digs that goaded Russia on, so that she got the reputation of being surly, warlike, aggressive. For what?

"Don't forget that it has always been the policy of both the United States and Great Britain to goad her *chosen* enemy into being the bad, inhuman aggressor. *That's* what I *think* has been going on. I think the president knew almost a year ago what Topanov was working on, and about how long it would take. I think he timed things very nicely."

"Now," Johnny's voice implied he was winding up his speech, "What I want is absolute proof. I want a scoop that is a scoop. I want, without warning, to bring the American public all

the facts; the proof that their president plans on ruling the world! What I want you to do, and all my other boys all over the country, is to keep an eagle eye on every atom scientist constantly. I want to know when each of them so much as scratches his head, and why. And I want to know it within hours so that I can co-ordinate everything and know what's going on when it goes on—not a week after it happens. I want lines tapped, telegraph personnel bribed, microphones in their homes attached to recorders, infra-red photographs and letters steamed open and photostated. This is a crusade!”

“What about the do-re-mi?” a reporter asked.

“There’ll be plenty of that, too,” Johnny said. “Now get going. Work as a team. Some of you cover Topanov and Chadwick. Some of you cover the air terminals and railroads. Some of you cover the White House. We’ll use my office as a central clearing house, and see that your employer gets enough news to satisfy him. All you’ll have to do there is write it down and read it off. But I want action.”

He walked out without another word. But his forceful personality seemed to linger and dominate the room.

THE presidential yacht slid away from the protection of the shore and nosed its way carefully through the ocean swells.

Alex and Jerry stood on the bridge with the captain, watching the giant seas come toward the ship, slowly and majestically, to pass on either side, lifting the hull and lowering it with a constant, gentle rhythm.

The president was in his stateroom, talking by direct radio scramblephone with his office. Officially he had a cold and was seeing no one, but would talk over the phone from his office when it

was important enough. Right now he was talking to one of the senators who had something he thought important to discuss. The senator would never suspect that his call had been relayed to a navy land station and run through a scrambler and broadcast to the presidential yacht.

In a few hours a small boat would pull alongside and take Alex, Jerry, the president, and a few other men on board. Then it would head to a large aircraft carrier that could already be seen on the edge of the horizon, where the men would board a B-25 which would carry them directly to Moscow.

Jerry leaned on the rail of the bridge and was silent. He was thinking of Catherine, and of Olly and his book. He was slightly homesick, tinged with a faint hope that he might die before he got home. In other words, he was seasick. But, as is so often the case with mild seasickness, he didn’t know it.

He was very blue in his thoughts. The fact that his name would be immortal—if the race managed to survive that long—because Alex had charitably insisted that the report be called the Topanov-Chadwick report, did not elevate his spirits in the least.

He squared his shoulders manfully. He was facing the issue squarely now. He loved Catharine. If he married her they would have children and those children would have children, and then his descendants would be living in the last days, when people would cry out in pain and suffer untold agonies from the searing blasts of hard radiation. He could not willingly, with knowledge beforehand be the instrument by which such agony would be brought about.

No! He couldn’t. And he couldn’t let Catharine know the reason why. The secret was too dangerous for him to take that responsibility. There was

only one course open to him. He would have to break off with Catherine and not tell her why. Perhaps he would have to lie to her and say that he didn't love her any more.

He pictured the scene in his mind as his eyes stared unseeingly at the waves.

"Catherine," he would say, "I may as well tell you now as later. I know it will hurt you, but you might as well know the truth. I don't love you any more."

No. That wasn't any good. He had a sneaking suspicion that she would see through that. He was no good at lying. And Catherine had a genius for smelling a rat. It would have to be something better than that.

He frowned in intense concentration. It would have to be something good. Ah! He had it. Why hadn't he thought of it before. He would destroy her love for him. He would be a cad.

He pictured the scene in his mind. He would stop the car on some quiet country lane. He would make amorous love to her and imply that his intentions were far from honorable. His thoughts turned his face a little red.

Then the horrible thought hit him. Suppose she didn't mind? What would he do then? No! Emphatically no. That wouldn't do. It would have to be some other way.

He sighed miserably.

Alex, mistaking the sigh for impatience, said:

"It shouldn't be long now, Jerry. I see the small boat taking off from the aircraft carrier now. It should be here in half an hour."

Jerry nodded without looking. Alex returned to his conversation with the captain—they were discussing ocean voyages that each had made, and Jerry returned to his thoughts.

What could he do that would be sure to turn Catherine's love to hate? Mak-

ing dates and then breaking them, or not showing up, would only enrage her. She would worry about his mental health. She did that when he had stayed up all one night studying and could hardly see the ball on the tennis court the next day.

She had thought he was trying to hide something when he belatedly explained that he hadn't had any sleep. She worried for several days about whether he was having a nervous breakdown or not.

He sighed again. Then glanced quickly at Alex and coughed to cover up the sigh.

Suppose he started chasing after every girl on the campus? Gawking would get her if he kept it up long enough.

The only trouble with that was that he would have to spend too much time at it. And Catherine would probably think she wasn't attractive enough and spend a lot of money at the beauty shop and get a lot of new dresses. That would hit Alex's pocketbook. And anyway he didn't think he could gawk convincingly enough to disgust her. At least not enough to make her break off with him.

He sighed gustily this time. It was no use. But maybe he would die before he got back. Then the whole problem would be solved.

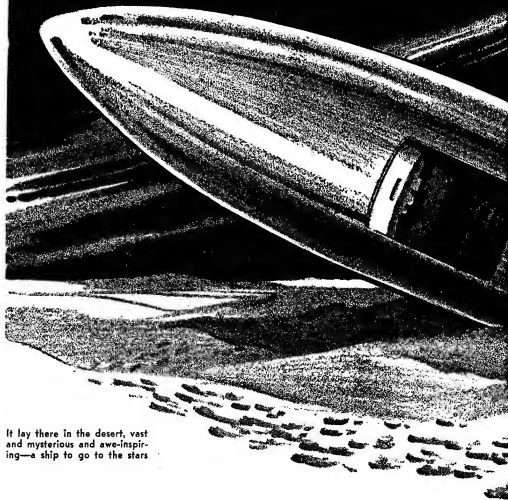
A picture rose in his mind. He was sitting in a black touring limousine, riding along a street in Moscow. Suddenly a bolshevik dashed out and pointed a rifle at his head and fired. He slumped down, his head a gory mess.

Jerry shuddered at the prospect. His eyes wrenched back to his present surroundings. The motion of the boat seemed to be getting more deliberate. It made his eyes jump around a little. He concentrated on that sensation. Yes. It was definite. There was a distinct pressure on the top of his eyeballs when the ship went up, and a distinct pressure on the bottom of them when the boat dropped in a trough.

Funny he hadn't noticed that before. But then the boat seemed to be rocking more
(Continued on page 101)

THE PROP

by WILLIAM LAWRENCE HAMLING



It lay there in the desert, vast and mysterious and awe-inspiring—a ship to go to the stars

BOBBY KINCAID reined in his black and white pinto pony and a flurry of dust swept up around him.

"Hey, Skeeter—are you home?"

The boy leaned forward in the sad-

dle, his bright blue eyes sweeping over the small decrepit shanty on the edge of the desert. Small wisps of scraggly grass sprouted around the base of the ancient wood walls. A tumbledown roof leaned crazily forward, with

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patches of tar paper tacked over rotting holes. From the chimney—a rusted length of old stove pipe jutting out from one corner of the roof like a forgotten stump—wisps of smoke stirred.

"Skeeter! It's me—Bobby Kincaid!"

The door of the shack, hanging limply on one hinge, creaked slowly open. A grisly bearded covered face peered from the opening.

Bobby waved.

"Hello, Skeeter."

The door pushed open further and a stooped figure shuffled out into the sunlight. The old man blinked his eyes in the glare and then a smile pulled his lips back, revealing a set of craggy yellowed teeth.

"Well, ain't this a surprise! Bobby Kincaid—where did you come from?" He scratched his beard with a long bony finger. "I thought you was away in school."

Bobby laughed. "Skeeter, you old hermit, don't you even know it's summer now? School's out for the year!"

The old man shrugged his stooped shoulders. "Reckon it don't make much difference what time 'o year it be, far as I'm concerned. One season's the same as another out here on the desert, son." He shuffled forward and stood beside the pony. "So you're on your vacation, eh, Bobby? How was school this year?"

Bobby jumped lightly from the pony. "Oh, about the same, Skeeter. I'm going into eighth grade this fall."

"Ya don't say!" Skeeter replied. "Why I recollect when you was no more than a gopher high. Your daddy used to ride out here on the desert past my shack with you perched on the saddle in front of him. . . . Seems just like yesterday."

"I'm growing up, Skeeter. I'm twelve now," Bobby said proudly.

Skeeter slapped the boy jovially on

the shoulder. "Sure am glad to see you again, Bobby. I suppose you'll have a lot of fun with your mom and dad on your ranch this year."

The boy's face clouded and he walked aimlessly about, kicking at the sand. His little mouth was puckered up to the verge of tears.

"What's the matter, son," Skeeter asked haltingly. "Anything wrong?"

"I guess maybe I won't have much fun, Skeeter. Mom is always throwing parties and doesn't have time for me. And dad's directing a big movie and can't get out except on week-ends. When he does come there's always a party."

The old man rubbed his beard thoughtfully. "Well now, don't you like parties? I thought they was supposed to be fun."

Bobby looked up at him with misty blue eyes. "They're grownup parties. And I'm not grownup. Mom sends me off to my room." He kicked a little mound of sand. "Dad promised he'd buy me an airplane this year to play with. But he didn't. I guess they all haven't got time for me. I wanted that airplane too, I want to be a flyer when I grow up."

"An airplane?" The hermit laughed. "Ain't that a mite too dangerous for you, Bobby? You ain't old enough to have one of them—"

Bobby shook his head vigorously. "I don't mean a real, honest to gosh airplane. I mean one I can play with—practice on until I'm old enough to get a real one!"

Skeeter bobbed his head. "Oh. That kind. Why don't you remind him, maybe he just plumb forgot."

"I did," Bobby said bitterly. "But he said he hasn't time now. He said next year. I don't want to wait till next year. I've got all summer, and I want to play."

THERE was a hissing of boiling water from inside the shack. The old man turned. "Wait just a minute, son, I got some coffee brewin. I'll be right back."

Bobby waited. He patted the cool wet nose of his pony and gazed out across the desert. It was calm and beautiful out there. Bobby liked the desert. It was quiet and friendly. The sun shimmered down on the sprawling sand hills, scattered with desert grass and sage brush, and sent streaks of color bounding off to the horizon. He heard Skeeter come out of the shanty.

"I guess I better go now, Skeeter. I don't want to bother you."

The old man looked closely at the boy. He saw the troubled frown that creased the small white forehead, and the misty brightness of eyes that were close to tears.

"You ain't no bother to me, son, I'm mighty glad you dropped in. Say, I just had an idea while I was putting off my coffee. Maybe I can help you find something like the airplane you want so bad. . . ."

Bobby stared at him. "Huh? You? An airplane? I don't understand."

Skeeter grinned, showing his aged yellowed teeth. "Well, now, don't I rightly mean a real airplane, but I reckon it's as close to one as you can get. Maybe more so, cause this plane was made to fly a lot higher and farther than most others. And it's bigger. I—"

"Gosh!" Bobby said. "A ship like that must cost an awful lot of money!" The eagerness left his face suddenly and his eyes fell. "I don't have any money, though, Skeeter. . . ."

"Money?" Skeeter snorted. "Who said anything about money! You can have this ship for nothing, far as I know."

"For nothing?" Bobby's eyes showed amazement. "Doesn't anybody own

it?"

The old man shrugged. "It belongs to the desert now, son. It's been out there for a long time. You can have a good time playing around with it."

Bobby danced wildly about the old man. "Where is it, Skeeter? Tell me where!"

Skeeter grinned. "Take it easy, son, it ain't going to fly away. I guess it never will do that. It's out there, just a couple miles east of the valley trail." He raised a thin bony hand and pointed.

Bobby followed the gesture with his eyes. Eagerness was written all over his round little face. "You sure it will be all right, Skeeter? Nobody will chase me away?"

The old man laughed. "Guess I'm about the only person on this stretch of desert, Bobby. But you want to make sure you don't get lost. Keep to the trail. You'll find it."

Bobby was back in the saddle. He had the reins gripped tightly in his hands. "I'll find it, Skeeter—and thanks a lot!"

The hermit watched him ride off down the trail with wistful eyes. "Just an old forgotten prop, that ship is. Can't do him no harm. Nice kid, that Bobby. Too bad about his folks."

He sighed and shuffled back into his shack.

IT was a long, winding, dusty trail. It curled over the sand like an endless serpent. The sun beat down on it, sending shimmering heatwaves up on the silent air.

Bobby rode down the trail whistling. His eyes were bright, eager. He kept looking off to the right of the road, to the east, as Skeeter had said. He saw only rolling hills of sand and sage brush.

"He said it was a big ship. He said it could fly higher and farther than any

others. Gee . . ." Bobby said softly to his pony. He patted the black and white head. "Gosh, just think, Ginger, a real ship all for myself!"

The pony neighed as if in answer. Bobby started whistling again. Then he stopped and a small frown crossed his face. "Unless maybe Skeeter was just fooling me . . . Hey, Ginger, what's wrong?"

The pony had been trotting along the road when suddenly he reared. The movement almost threw Bobby from the saddle. He gripped the pommel with quick fingers and held on desperately.

Then he heard it. The dry staccato buzzing. He knew what it was even as he heard it. And the knowledge brought a cold chill to his spine.

The horse bolted off the left side of the trail, and Bobby, holding desperately to the saddle, saw the rattler coiled not three feet away in the center of the trail. It struck in a movement too fast for the eye to follow. A blur of motion, of wide open jaws as the pony shot past. Even as the snake lunged forward Bobby grabbed the reins with one hand and pulled sharply to the left. The movement saved them. The horse kicked savagely sideways, just out of reach of the fangs, and before Bobby had time to think, the horse was racing, panic stricken, off over the sands.

For long minutes Bobby held tightly to the reins. They raced through sage brush, over sand hills, past little mounds of earth where prairie dogs would sit at sunset. Bobby pulled at the reins, he dug his legs deep into the pony's sides, but the horse kept running.

"Ginger! Ginger! It's all right, Ginger! Whoa!"

Ginger kept running.

It seemed like hours. But finally,

through sheer exhaustion, the pony slowed. Foam stood out in a lather on the horse's muzzle. His sides were heaving in tumultuous gasps. Bobby loosened his grip on the reins and ran his fingers over the tense, twitching ears of the pony.

"Easy, Ginger. There's nothing to be frightened of now." He looked wistfully about him. "We'll never find it now, Ginger. That nasty old snake had to scare you. We're way west of the trail. But it's all right, Ginger, we'll come back tomorrow. . . ."

Bobby was staring off in the distance. Off toward a bright gleaming mass jutting out of the sand. It was the gleam of metal, a long, tapering mass of metal, lying forlorn under the desert sun.

"Look, Ginger!" Bobby shouted. "Look!"

Ginger looked. But only because Bobby pulled his head in that direction. Ginger must have seen it. But he couldn't talk and say so. Bobby urged him forward.

"Come on, Ginger, that's it! See how it glitters in the sun! It's the ship Skeeter said we'd find out here! And I can have it—it will be mine! Hurry Ginger!"

Ginger couldn't hurry. But he travelled over the sand as swiftly as his tired legs would go. Ginger wanted to lie down, to rest his tired body. He was thirsty. The foam fell in tiny driplets from his muzzle. But he trotted on.

Bobby stared at it. He stared and stared. He looked at it from one end to the other. And a sigh escaped his lips.

"Gosh. Gee. . . ."

IT was all silver and half buried in the sand. It was long and tapered with strange fin-like tubes jutting from its rear. A soft desert breeze whis-

pered around it, sent small flurries of sand scudding along its sides.

Bobby jumped to the ground. He forgot about Ginger, but Ginger didn't mind. He was too tired to care. Bobby walked forward, his eyes round with wonder. He was almost afraid to approach it.

"It's big . . . just like Skeeter said," he breathed. "It's beautiful. And I can have it—all for myself. Gee. . . ."

He walked up to it and thrust out a small trembling hand. It was warm, almost hot under the steady burn of the sun. Bobby ran his hand along the smooth metal surface. The touch brought a thrill to him, of something beyond his understanding, of something new, different. . . .

He walked around the front of the ship. It was all metal, smooth, glittering metal. He came to the other side. He stopped, staring.

There was a small dark crack in the side of the metal. For a moment Bobby thought it was a hole. He walked up to it slowly.

"It's a door!" he breathed. "A door!"

It wasn't a door. But it was the nearest thing to it. Bobby put his hand in the opening and pushed with all his might. A section of the metal slid open soundlessly. It was dark inside.

Bobby suddenly felt fear. It was dark in there. Anything might be inside. Maybe the door would close after him. Maybe he would be trapped, locked inside. On the other side of the ship he heard Ginger neigh.

"Skeeter said it was all right," he said to himself. "There is nothing to be afraid of."

Bobby walked into the opening.

It wasn't so dark inside. The desert sun lanced in through the opening and sent golden lances of light along the walls. Bobby walked forward.

It was a long hall. It was lined with

metal on both walls, and it was silent. Not even the whisper of the desert breeze stirred inside. Bobby walked on.

There was a door. It stood tall and lonely at the end of the hall. Bobby knew it was at the end of the ship, the front end. He looked at the door. There was no handle.

His eyes followed the long seam that ran from floor to ceiling along the door. He knew it was a door. It had to open. Then he saw the button alongside it. Bobby reached out and pressed.

It slid aside. Swiftly, soundlessly. Bobby followed the sunlight into the room.

It was large and oblong. It was all gleaming metal. The faint rays of sunlight, filtering down the hall, gleamed from the metal.

At the far end of the room there was a long banked panel. A row of strangely shaped chairs ran along the front of the panel. The panel itself was a maze of buttons, switches, and dials.

"Gee." Bobby whispered, and his voice sounded small and hollow in the room. "Gosh."

Bobby walked up to the panel.

He saw the bones.

They were slumped over, a tangled heap, leaning against the panel. Two little piles. Arms that were no longer arms, legs that were no longer legs, and grinning spectral skulls.

"Gosh!" Bobby murmured. "Wonder who put them here? Maybe they got locked inside. . . ." Bobby looked fearfully back down the corridor, but the outside door was open, the desert sun streaming in.

There was a small square screen over the panel. "Movies." Bobby decided. He walked past the strange chairs with the slumped over bones. He looked at the myriad dials and rows of buttons. He scratched his head perplexedly. "Gosh, I'll bet it would take a long

time to learn how to fly this ship!"

He stood looking, staring around him. And gradually he felt it, an intangible urge, an astral desire. Bobby knew suddenly what he wanted.

"It's mine now," he breathed. "And I'm going to learn about it. I must!"

THE sun was slipping, a huge red ball in the sky, down over the western horizon. It sent streaks of flame darting across the desert sands, and a cool evening breeze swept in over the heat.

Bobby rode away, his eyes glistening. He hardly saw the desert as Ginger trotted home. He saw only the gleaming silver of the ship that was his. The ship that Skeeter had said he could have.

He reached the ranch just as the sun faded from view.

"Bobby! Bobby Kincaid, where ever have you been!"

Bobby heard his mother's voice calling from the house even as he led his pony to the stable. A caretaker relieved Bobby of the horse and winked knowingly.

"Your mother's been worried about you, Bobby. Better get along inside."

Bobby nodded absently. He ran across the yard, already filling with cars.

"Another party!" he said disgustedly. "Bobby!"

Myra Kincaid stood on the veranda waiting for him. She was a tall beautiful woman, and wore her shoulderless evening dress with the knowledge that she wore it well. Bobby trotted up.

"Yes, mom?"

"Bobby! You've been gone all afternoon. I thought you were only taking a short ride—where have you been?"

"In the desert, mom."

"The desert! Bobby I won't have you riding off like this. Can't you play around the ranch? Now get along in-

side and have your supper."

Henry Kincaid strode out onto the porch. He was a well built man in his forties. He had sleek black hair and the faintest suggestion of a moustache. His eyes were twinkling.

"Well young man! I drive in all the way from Los Angeles to find you gone! What have you been doing?"

Bobby stared from his mother to his father. He ran to his dad.

"I was out to see Skeeter—"

"Skeeter!" Myra Kincaid interrupted. "That dirty old hermit—Bobby I told you to stay away from him!"

"Now Myra, let the boy alone. What about Skeeter, Bobby?" Henry Kincaid gazed down at his son. Bobby smiled.

"Skeeter is a nice old man, dad. I like to talk to him. He's so lonely out there on the desert. . . . Besides, he showed me where the ship was!"

"Ship?" Henry Kincaid frowned. "What ship?"

Bobby spread his arms suggestively. "It's a big ship—all silver and metal. Skeeter said I could have it, that nobody owns it anymore. Gee it's big."

His father gazed thoughtfully for a moment. Then he smiled. "Oh, *that* ship. I see. Well you better get inside and have your supper, Bobby. Mom and I have a party tonight."

Bobby lowered his eyes. "Party?" he said. Then he looked up at his dad. "Can't we play tonight, dad? Just for a little while?"

Henry Kincaid shook his head. "Maybe next week, Bobby, and maybe I'll have a surprise for you. Now get inside."

Bobby walked slowly into the house. Behind him, his mother was frowning.

"What was that business about a ship, Henry?"

He lit up a cigarette and laughed. "Oh, that! Funny, but I had almost

forgotten about it. A couple of years ago we shot some interplanetary scenes for a Martian picture that was later scrapped. We had a special prop spaceship built for the scene. After they were shot we left the hulk out there in the desert. There's nothing in it that could hurt the boy. And he always has been interested in ships. I'm going to bring him that airplane I promised. Come on, let's get back to our guests."

BOBBY hurried with his breakfast. Ginger was waiting at the stable. Bobby rode out from the ranch, his small face eager.

"Come on, Ginger, mom said I could play all day. I've got enough lunch for both of us!"

Distance sped under the pony. Down the winding road to the edge of the desert, and Skeeter's shanty. Bobby reined in beside the shack.

"Hey, Skeeter! It's me, Bobby!"

There was no smoke coming from the chimney. Bobby called again. Still no answer. He patted the pony's head. "Guess Skeeter isn't home, Ginger. Let's go."

Down the trail. Past the spot where the rattler had struck. Bobby followed Ginger's hoof marks in the sand.

It lay there, still and quiet in the morning sun. Bobby's eyes were bright with pleasure as he looked at it, long and silver and tapering.

"It's still there, Ginger!" he said softly. But Ginger didn't care very much. The pony trotted slowly up to the ship and Bobby jumped to the ground.

His feet made mottled patterns in the sand as he walked around the gleaming hull. The door in the side of the ship was open.

The room hadn't changed any. The panel was still there, the strange dials

and buttons. And the bones. Bobby looked at them for long moments. Then he walked past them and ran his fingers over the small square screen over the panel.

"Just like a movie screen," he said. "Wonder where the movies are?"

There were no movies, but Bobby wasn't sure. He looked at a row of buttons beneath the screen. His fingers moved toward them. He pressed.

From somewhere came a sound. A buzzing hum of sound. Bobby jumped back from the panel fearfully. The buzzing faded.

He looked at the screen. It was shimmering. Little streaks of flame danced across it, a miniature rainbow. And with it came a buzzing hum. The same hum that had faded seconds before. Only this time it was louder—closer it seemed.

And the colors faded.

And there was a face.

SHE was a pretty little girl. She was the prettiest little girl Bobby had ever seen. She was smiling at him with small white flashing teeth. She was laughing with her strange greenish-gold eyes—eyes that seemed to have little sparks dancing in them. And there was sunlight gleaming in her hair—hair that fell softly around small white shoulders.

"Gosh!" Bobby murmured. "Gee, she's pretty—I haven't seen her in the movies before."

The little girl was laughing, Bobby thought. No, she was just smiling—as if she was glad he was looking at her. Bobby looked at her clothes.

"Gosh, she's dressed funny, just a little silver dress. Not much of that either. Wonder what picture she's playing in?"

She was waving now. A small tender hand, a small eager wave. Bobby

turned around, almost expecting to see somebody behind him. Then he laughed.

"There's nobody here but me. She isn't waving at anybody, it's just a movie and . . ."

Suddenly Bobby frowned. He looked anxiously around the room. There was the panel, the bones, and the chairs. There were the switches and dials and buttons. But on camera, no projector of any kind.

"Gee—I can't find any movie machine! Maybe—"

Bobby looked back at the screen. The little girl was still there. But she wasn't smiling. She wasn't laughing anymore. There were tears rolling down her cheeks.

"She's crying!" Bobby said softly. He looked closely at her. But her eyes weren't on him. They were looking past him. Bobby followed her gaze.

She was looking at the bones.

"She is looking at them!" Bobby said softly. "She really sees them!"

And then she was looking back at him, almost it seemed, as if she knew what he was thinking. Her head bobbed in a wistful nod, and Bobby watched the tears roll down her cheeks.

"Don't cry, little girl." Bobby pleaded. "Is it because of the bones? Do you know what they are?"

The little girl didn't answer. Only the faint buzzing hum disturbed the quiet. But again her head nodded as the tears fell.

Bobby turned grimly and walked over to the chairs beside the panel. He reached out and gathered the bones together in his hands. Then he shoved them under the panel, out of sight. He turned back to the screen smiling.

"Now you don't have to cry anymore," he said. "You are too pretty to cry . . ."

She looked at him from the screen.

And then suddenly she was smiling again, and there was a longing in her eyes that made Bobby happy inside.

"Where do you live?" he asked. Then he laughed. "I forgot, you can't answer me!" He pointed to her, spread his arms wide, and raised his eyes questioningly.

She seemed to understand.

She faded from the screen.

"Don't go away!" Bobby called anxiously. "Please come back!"

LIGHTS flickered again across the screen. It shimmered, the buzzing grew, a loud crackling hum. And the screen cleared.

The little girl was gone. Bobby was looking at a maze of glistening spires reaching high toward a hazy blue sky. He saw long winding ramps connecting the spires, high in the air. And he saw tiny dots moving along the ramps far below.

"Gosh!" he breathed. "A city! A beautiful city!"

The scene sped on. He saw strange wonderful mountains with snow glistening on peaks that stretched far toward the heavens. He saw green verdant valleys with limpid brooks gurgling through them. He saw endless tracts of flowers waving delicately in a soft breeze. He saw lakes of bright blue water dotting the horizon.

"Gosh!" Bobby whispered.

And he saw the children.

They were playing in the flowers, along the brooks, and by the lakes. There were hundreds of them, boys and girls, in strange costumes of silver and gold. They were laughing and running, playing with strange toys, and—

The scene faded.

"Wait!" Bobby called out. "I want to see more—please!"

She was there again. The little girl. And there were no tears now. Only

gladness and a smile. Bobby smiled back eagerly. He pointed to the screen.

"Gee, that was pretty. All those boys and girls. . . . Where is it at?"

She kept smiling and watching him. Bobby scratched his chin. Then suddenly he bobbed his head. He pointed to himself and then to the screen. "Could I go there and play too?" he asked as he pointed.

The little girl looked wistfully at him. The little sparks danced in her eyes. And she was gone.

For long moments the screen was blank. Bobby peered at it, longingly, hopefully. Why had she gone? Had he frightened her? Where—

She was there. But she wasn't alone. Bobby could see a large white room with strange machines looming in the background. She was standing in the middle of the room talking to a tall man in a white garment. The man was smiling down at her and nodding his head. Then she was looking at Bobby.

Bobby frowned. He didn't understand. Was she trying to show him something else? He watched.

The tall man pulled a gleaming metal panel on rollers to the center of the room. The little girl stood by the panel and pointed to it. Bobby looked.

It had dials and switches and buttons. It—Bobby suddenly looked down at the panel beneath the screen. It was the same kind of panel as the one in the picture!

The little girl pointed to the panel beside her and then to the one beside Bobby. Bobby nodded eagerly. He knew. He knew.

"You're going to show me how it works!" he said.

MYRA KINCAID was worried. It had been nice to get Bobby interested in something so she could put her attention to the parties she had

planned. But Bobby was too interested. He didn't bother her anymore. He was up at dawn, ate a hurried breakfast, had the cook prepare him a lunch, and was gone for the day. She didn't like it.

"Henry," she spoke to her husband over the phone. "Are you sure it was a good idea to let Bobby go running off into the desert like this? He seems to be all wrapped up in that silly old prop ship of yours. I don't like it having him gone all day like this—anything might happen why, just the other day he told of coming on a rattler out there!"

Henry Kincaid thought for a moment over the wire. "Tell you what, Myra. I've finished work on the new picture and have a couple of weeks off. What say we run up to Arrowhead. I'd like to spend a little more time with the boy myself. And I've bought that airplane I promised him. I'll be in tonight, and we'll make plans. See you."

* * *

"Hi, Skeeter!"

Bobby reined his pinto pony in beside the shack. Skeeter sat in the doorway, slowly drawing on a discolored corncob.

"Why, hello there, son. Haven't seen you around for the last few days."

Bobby shook his head. "I been here a couple of times, Skeeter, but you weren't home."

The hermit sighed. "Had to make one of my trips to town. Nearly ran out of coffee and vittles. By the way, son, did you find that there ship like I told you?"

Bobby looked off into the western sunset, his eyes dreamy. His voice seemed to come from a long way off. "Yes, Skeeter, I found it. Gee, but it's a wonderful ship. It came from a far ways from here, Skeeter, and it can fly back—if you know how!"

Skeeter raised a shaggy eyebrow. "That so? How do you reckon that, son?"

"She showed me, Skeeter, the little girl. Gosh, but she's pretty . . ."

The old man looked questioningly up at the boy. "What girl, Bobby?"

"Why the girl in the picture!"

"Oh," Skeeter said. "Too bad they never released that picture. Yep, she's a mighty pert little miss. Saw her many times myself when they were shooting the scenes. Hair black as a raven."

Bobby frowned. "Her hair isn't black, Skeeter, it's gold. And what do you mean about shooting the scenes—and who didn't release them?"

Skeeter shrugged. "Reckon I can't tell you much about that, son. Better ask your daddy, he knows more about that picture than I do. He directed it."

Bobby looked off across the desert into the sunset. Daddy . . . picture . . . scenes . . . black as a raven . . .

"What's the matter, son?" Skeeter asked.

"Nothing," Bobby murmured. "I better get home now. Mom will be worrying."

Skeeter watched him ride off down the trail. He scratched his beard with the stem of the corn cob. "Can't quite figure him out," he muttered.

THE party was all ready in progress.

Bobby could hear the people laughing and talking in the front part of the house. He heard the clink of glasses and the slow tempo of a waltz from the victrola. He looked sullenly at his food from the kitchen table. He wasn't hungry.

"Oh, there you are, Bobby."

Henry Kincaid came through the swinging door into the kitchen. Bobby looked up.

"Hello, dad."

"Is that all you have to say, Bobby? You don't seem very glad to see me!" his father said, sitting down opposite the boy.

"Dad," Bobby fumbled with his fork. "Skeeter said something about the ship . . ."

"Ship? Oh, that. What about the ship, Bobby?"

Bobby raised wistful eyes. "He said that you were directing a picture—with a little girl—and the ship. Is that true, dad?"

Henry Kincaid nodded. "That's right, son. That's the only reason I've let you go wandering out there on the desert. I had that ship specially built for a fantasy film. It was just a prop that we used in a number of scenes. But the producer cancelled the film at the last minute and it wasn't released. Why do you ask?"

Bobby was close to tears. His eyes were brimming. "Th-then it won't fly—it won't take me to see—her?"

His father frowned. "What are you talking about, Bobby? Of course it won't fly, you're old enough to know that—it's just a prop!"

Bobby looked down at his plate to hide the wetness in his eyes. His father leaned over and patted his shoulder.

"But I've got a surprise for you, Bobby. I've got some time to myself now, and you, mom and I are going up to Arrowhead in the morning for a holiday! How does that sound?"

Bobby didn't answer.

"And do you remember how I promised you an airplane to play with? Well, I'm having it shipped up to Arrowhead for you. How do you like that?"

Bobby didn't answer.

"What's the matter, Bobby? Aren't you glad? . . ."

Bobby looked up. The tears were gone. His little face was white and drawn. "It's got to fly. I know it will

fly. She wouldn't lie to me!" he said savagely.

"Bobby—what—"

Bobby dropped his fork with a clatter and ran up the backstairs to his room. . . .

THE party was over, the guests departed. HENRY Kincaid yawned across the veranda toward his wife.

"I'm glad that's over. I'm so tired I could sleep standing up."

Myra Kincaid smiled. "Why don't you hurry off to bed? I'll be up in a few minutes. We've got a long ride ahead of us in the morning. Did you tell Bobby?"

He nodded. "I did, and he didn't seem pleased at all. That damned prop ship seems to have some kind of interest for him. Think I'll look in on him upstairs. Haven't heard a peep out of him since supper."

Upstairs, he walked slowly along the hall toward Bobby's room. Outside the door he stretched again. Then he opened the door and looked into the room.

It was empty.

"Bobby!" he called out sharply. There was no answer. He walked out into the hall and called again. "Bobby!"

Downstairs Myra Kincaid came in from the porch. "What's wrong?" she called up.

Her husband came running down the stairs. "Bobby isn't in his room!"

She frowned. "What? But that's impossible. Are you sure?"

"Of course I'm sure!" he snapped. "I tell you he's not there!"

They ran out on the veranda and looked out across the moonlit yard. It was empty.

"Bobby!" HENRY Kincaid called sharply.

There was no reply. Over by the stables a light was on in the caretaker's

house. The door opened.

"Were you calling, Mr. Kincaid?"

Henry Kincaid shouted across the yard. "Have you seen Bobby anywhere, Mike?"

Mike shouted back. "Yes, sir, he saddled Ginger about an hour or so back. Said something about a ship and he'd forgotten something. Said you had told him he could go."

Henry Kincaid swore in the darkness. Myra moved alongside him.

"Did you hear that, Henry? He's out in the desert—at night! He went to that ship of yours! Henry, I'm frightened!"

He took her arm grimly.

"Come on, we'll take the station wagon. I don't like this any more than you do. The boy might lose his way out there. If it hadn't been for that old hermit he wouldn't have gotten these ideas in his head!"

THE Moon shone full and clear on the trail. Down it, the Kincaid station wagon jounced at high speed. A trail of dust swept up behind it and spread over the sand like a cloud.

Henry Kincaid gripped the wheel tightly in his hands. He peered ahead in the glare of the headlights. Beside him his wife sat, her fingers knotted together helplessly. A building loomed ahead.

"That's Skeeter's shack," he announced. "Bobby might have stopped there."

He braked the car alongside the shack and honked loudly on the horn. A few moments later Skeeter came through the door, rubbing his eyes in the glare of the car lights.

"Hello?" he called out.

"It's Henry Kincaid—I'm looking for Bobby, did he come by here an hour or so ago?"

Skeeter scratched his beard thought-

fully. "Well now, that's a mighty peculiar thing, Mr. Kincaid. Seems like I did hear a horse beating past here, but I didn't think much about it. You say it was Bobby?"

"Yes, yes," Kincaid snapped impatiently. "He snuck out of the house while we were giving a party. I think he's gone out to that old prop ship. I thought you might have seen him."

Skeeter shook his head. "Bobby shouldn't go out on the desert at night like this. Mind if I come along? I can show you just where that ship is, case you've forgot."

Kincaid shrugged. "All right, get in the back. Hurry up!"

Skeeter shuffled into the car scratching his beard. "Guess maybe I shouldn't have told him about it, Mr. Kincaid, but I didn't see no harm in it . . ."

Kincaid drove rapidly. The headlights cut a swath in the gloom along the trail. They drove in silence.

Skeeter was peering intently through the windshield at the trail. Ahead of him, Henry Kincaid pointed.

"Where does that trail lead?"

Skeeter looked at a narrow path of hoof marks off to the left of the road.

"Can't recall ever seeing them before," he replied. "That's funny . . ."

They drove on. Minutes later Myra Kincaid stiffened in the front seat.

"There it is!" she cried, pointing off to the right of the road.

There it was, a rusted hulk of metal, rising lonely in the moonlight. Kincaid shot the car off the trail onto the loose sand. He held grimly onto the wheel and braked the car beside the hulk.

"I don't see Ginger," he muttered.

They hurried from the car.

"Bobby!" Kincaid called sharply. His voice faded over the sand. There was no answer. They stood waiting.

Skeeter mumbled in the gloom. Kincaid looked at him.

"What did you say?"

SKEETER pointed at the ground around them. "Mr. Kincaid, I reckon Bobby ain't never been here—there ain't nary a footprint or a hoof mark around this ship!"

"But that's impossible!" Kincaid replied. "All he's been talking about is this ship! You yourself told him where to find it! Where else could he have gone?"

Skeeter was running his fingers through his beard. Suddenly he stiffened. "Mr. Kincaid—you remember that little trail off to the left of the road backaways?"

Kincaid nodded nervously. "What about it?"

"Well now, I can't recollect any trail like that hereabouts. A horse, like Ginger could have made a trail like that. . . ."

Kincaid swore. "By God, you're right. Come on Myra!"

They tumbled back in the station wagon. Back on the road, eyes peering feverishly through the windshield. Beside him, Kincaid heard his wife gently sobbing. He set his teeth.

There it was, the trail. Skeeter pointed a long bony finger at it as Kincaid shot the car off the road. The sand was loose and the car swerved as the rear wheels bit in. Kincaid felt sweat beading his face.

The minutes sped by. Kincaid gripped the wheel tightly in his hands as he guided the car along the dimly revealed trail. The lights of the car were twin beams of light stabbing through the darkness.

And then Myra Kincaid sobbed hysterically.

"Ginger! Henry, there's Ginger!"

He peered intently and heard Skeeter swear behind him.

"Damned if it ain't! That's him all

right!"

"The trail ends here too!" Henry Kincaid said wearily. "We've found him!"

They piled from the car. Ginger, hobbled in the sand ahead, whinnied plaintively.

"Bobby!" Kincaid called out.

There was no answer. He gripped his wife's arm tightly as they looked frantically about. Skeeter shuffled up behind them.

"Can't understand it. There ain't no ship here, this ain't the way I told him to go. I—"

He broke off in mid-sentence. He was staring ahead, where tiny footprints were legible in the sand. The Kincaids saw them too. But they weren't looking at just the footprints.

"Ship?" Kincaid muttered strangely.

"Ship?"

They were looking at a deep tapering depression in the sand, with the footprints guiding around the edges of it. Footprints that had walked up to something, up to it and around it. At one end of the depression the sand was scorched and blasted away.

Skeeter stared dumbly.

"Don't rightly reckon I understand this," he muttered. "Bobby said he found the ship. Said there was a little girl . . ."

He looked off into the night suddenly remembering.

"He said she had gold hair—but *I remember plain as day her hair was raven black!*"

The stars twinkled down into his eyes. "Reckon I never saw *that* little girl, Bobby," he whispered.

ATLANTIS: STEPPING STONE BETWEEN EUROPE AND AMERICA

THERE are abundant proofs that at one time there must have been uninterrupted land communication between Europe and America. When you compare the animals and plants of the Old and New World, you will notice that nearly all belong to the same genera. This fact indicates that they radiated from a common center after the Glacial Period.

Recent discoveries in the fossil beds of the Bad Lands of Nebraska prove that the horse originated in America. It developed, rising in the course of ages, from a creature no larger than a fox until, by successive steps, it became the true horse of today. How did the horse pass from America to Europe and Asia if there was no connecting link between the two continents?

The existing alpacas and llamas of South America are but varieties of the camel family. The cave bears of Europe are identical with the grizzly bears of our Rocky Mountains. The glutton of Northern Europe, in the Stone Age, is identical with the wolverine of the United States. The Norway elk is the same as the American moose. The reindeer which once occupied Europe as far down as France, was the same as the reindeer of America.

Cattle were domesticated among the people of Switzerland during the earliest part of the Stone Period. Even at that remote period they had been developed out of the wild forms akin to the American buffalo. The wild race from which our domestic sheep was derived is now extinct. The

remains of domestic sheep are found in the debris of the Swiss lake-dwellings during the Stone Age. The domestic horse, hog and goat also date back to antiquity. Historical records 7000 years old show that during that time there was no similar domestication of wild animals. This fact shows that there was a vast period of time during which man must have lived in a civilized state to bring about the domestication of so many animals.

When we turn our attention from the animals to the plants we find the same state of things exists. The magnolias, tulip trees, evergreen oaks, maples, etc., now growing in the south are from the Miocene Age of Europe. It would seem to be impossible that these trees could have migrated from Switzerland to America unless there was unbroken land communications between the two continents. A comparison of the flora of the Old World and the New goes to show that not only was there communication by land over which the plants of one continent could extend to another, but that man must have existed, and helped this transmigration, in the case of certain plants that were incapable of making the journey unaided.

The banana is seedless. It is found throughout tropical Asia and Africa. In what way was this plant which cannot stand a voyage through the temperate zone, carried to America? It was probably cultivated by the people of Atlantis, and carried by their civilized agricultural colonies to the east and the west.

—Frances Yerxa

Negative Problem

by Frances Yerxa

In the hands of one scientist lay
the preservation of the space patrol.
But this man was a fool—they said ...





A series of tremendous blasts suddenly were visible on the visi-screen. And a cloud of smoke darkened the whole area

CAPTAIN Red Warren sat tensely before the target-screen, his fingers playing a silent tune on the ship controls. The Constant sped forward, dodging the crimson bursts of death that were seeking the space ship's smooth flank. Warren's body was tense, but his face, smooth and set in definitely sculptured lines, seemed relaxed. His eyes were narrowed. He

played over those three banks of power and control buttons as though he were in his church at home, teasing beautiful music from an organ.

They were somewhere in the no-man's-land between the last outpost of Pluto, and the first of the Green Planets, Circ. Just where, even Warren wasn't sure at present. The Circ patrol ships had driven him off course. He

was finding his way back. He was sure of just one thing. There was deadly calm inside of him. A calm, icy feeling that made him afraid—for himself. He never *could* experience fear. It was just a tied up, emotionless state that made his own men frightened of him. He didn't like it.

Rex Barren, the tall, thin navigator of the Constant, looked up from the plotting screen. Barren was frightened, but he had good control over his voice. It wasn't fright for what was coming, so much as for what had just passed.

"I think they've lost the range," Barren said in a tight voice. "Just to play safe, better take another tangent. Fifteen degrees forward will take us straight in to Reading Field."

Warren nodded without looking around. He changed the dial-set and the ship dived sharply. The red bursts were far away now, seeking the Constant, and not finding her in the velvet of darkened space.

Peter Reading, seated alone in the far corner of the cabin, cried out sharply as the Constant swerved. He had been working over certain figures, on a letter-board balanced on his knees. The sudden change of course threw him against the arm of the chair.

He looked around at both men and was ashamed that they had heard him cry out in pain. The pain in his side was bad, but he smiled at Warren, as the Captain turned around.

"You caught me by surprise, Captain," Reading said.

Red Warren chuckled. His fingers, the backs of them covered with black hair, were poised on his hips. His eyes were filled with little dancing specks of silver.

"Reading is reading a book," he said. "Don't you know we were dodging death to get out of that mess? You're as cool as they told me you'd be, Read-

ing."

He was thinking;

"Sure, he's cool. He's *cold*. No emotion. The under side of my ship blasted away, and ten of my best men dead, because he ordered us out on this wild-goose chase."

Reading stared at him with mild, blue eyes. Reading had Red Warren puzzled. The little scientist wasn't a warrior, yet he faced death without flinching. Almost without noticing it. That bothered Warren. It bothered him a lot.

Reading said:

"I'm frightened, Captain. I'm frightened to death. I don't have time to think of it, that's all. I don't have time for anything but the problem you and I are working on."

What problem? Warren knew nothing about it. Reading was doing work for the War Department. He, Red Warren had to transport Reading into enemy territory, let Reading choose an enemy ship, and it was up to Warren to capture it and bring it home. At that, Reading had chosen a broken down tramp freighter, not even valuable to the Fighter Command.

Well, if there was any satisfaction to it, Warren had his ship. It was bucking and slipping along behind them now, the tow line bringing it home like an ugly, suckling little beast, following its nobler master.

"Reading Field dead ahead," Rex Barren said from the plotting screen. "Better give her half power, Captain."

AUTOMATICALLY Red Warren closed the under-jets, and the Constant slackened speed. Reading Field. Peter Reading, so famous that the army had named a Reading Field after him on each of the planets. What would they do now, with Peter Reading unable to do all the great things he

was supposed to be capable of? Would they change it to Reading's Mistake? They should, Warren thought. They should give Reading this unholy, remote outpost of Pluto and let him live here alone, enjoying all the deserted, ugly things that the place stood for.

"At least our captive ship is safe," Rex Barren said with a vein of sarcasm in his voice. "I hope you are able to make use of the specimen, Professor Reading."

He made it sound like a dead wale, brought home to fill a spot in some museum. That was the way he felt about it. Barren knew a lot of those men who had died on this damned trip. He didn't like Reading. He didn't like him at all.

Reading seemed lost deep in thought. Finally he said in a faltering voice:

"I won't try to tell you that I'm sorry the trip cost you so much. It might mean that we can save millions of lives. Perhaps save our own civilization from falling. That's why it was—important that we . . ."

Warren pushed the control-lock into place. He whirled around, facing Reading. The silver specks were gone from his eyes. They were cold.

"What's the use of us talking that way, Reading?" he said. "You're a big shot. We had orders from the Major to make this trip. We brought back what you wanted. That ship dangling at the end of our tow-line isn't worth the metal that's in its rusty plates. I gave up the best crew I ever had bringing it in. Remember this. We don't like you. We don't even want to hear your voice. We did what we were ordered to do, but all the high sounding stuff you can invent won't *make* us like you."

Peter Reading looked suddenly washed out and broken. He wasn't young any more. He needed help. He

needed the friendship of strong men like Red Warren. He ran thin, white fingers through the wisps of grey hair that partly hid his scalp.

"I'm sorry you feel—like that," he said.

"Well we do," Barren snapped. "Report us to the Major if you want to. Tell him we acted in a manner unbecoming to officers. Tell him to toss us in the brig. We still have the privilege of disliking you keenly, and I for one am not sorry that we've told you what we think."

The cabin was very silent after that. Peter Reading stared out the rear port at the stubby, cigar-shaped freighter they had captured on Circ. His eyes were a trifle red. His hands shook when he tried to look at the book of mathematical theory. Right now he was more worried about the loss of his friendship with these two space fighters, than he was the great problem of survival the Planetary System was facing. Why, he wondered, is human nature like that? Peter Reading had always been admired and loved as a great humanitarian. Did the whole System hate him like this? Yes, he felt sure they did. He really couldn't blame them. He had brought it upon himself.

Captain Red Warren had lined up the bull's-eye target lines of Reading Field, and was going in for a shock landing. He spoke sharply to Reading.

"Buckle down the pressure belts," he said, "I don't intend to kill you after we've gone this far to bring you back alive."

PETER READING sat alone in the deserted cabin of the enemy reconnaissance ship. He had studied the strange equipment in the cabin for many hours. Occasionally he went to the port and stared out across the dark spaceport. Seven flights had taken off since

Captain Red Warren brought him back alive. A thousand ships, and two hundred had come back. Tears filled Peter Reading's eyes. He was a weakling. He could face the hardest of problems, but how could he let his brothers die like flies? Die for a lost cause.

He remembered that day, many years back, when the first ship came to Earth, from Circ.

Memory of so many years passing by, made Reading realize how old he had become in the service of his people. Sixty next month, and he was of no more value to them. He was failing.

The men of the Green Planets had come to Earth on a peaceful mission. They were little men, with small, narrow noses, and wide, grinning mouths. Their color was an ugly, pale green, but once you understood them, their voices and manners were excellent.

They lived for some time in New York City, and were entertained by all the higher officials of that city. They departed in peace. Exactly five years later, a vast army of ships descended upon New York. They hovered over the city, looking identical to ones of the Earth space-armadas. Then a vast mushroom of scarlet fire broke loose and when it disappeared, the ships were gone and there was no city left.

Peter Reading had not trusted the people of Circ and the other Green Planets. Many people did not connect the visit of the Green Men to the thing that happened to New York. Peter Reading did.

The story repeated itself, on every planet in the System. Cities were completely destroyed. The Army could not fight back. It couldn't, for the ships, whether friendly or otherwise, all looked the same. Somehow the men of Circ had copied our fleets. They had copied so well that Earth experts couldn't spot their own space-fighters

when dog-fights took place in the void.

Every major city in the Planetary System was destroyed. Underground centers were established, and from these, the System's armies fought on. They couldn't fight much longer. They were losing ships and losing the factories in which the ships should have been manufactured.

Peter Reading recalled the day when he got his first clue. His first long discussion with the War Board at Washington. It was a pitiful thing, this gathering of men who were licked. Men who no longer could make unified plans.

"We're beaten," one old space-army general roared. "We're trying to fight against our own weapons. We can't beat them, because their equipment is as good as our own, and we are outnumbered six to one, or worse."

Another agreed.

"Reading, here, has given up," he said. "He has been a great man in his day, but he's failing us now. Rather, we're failing ourselves. We've learned to lean on Peter Reading, because one intellect as great as his has been powerful enough to protect us. Now, we've been caught short, and there is no defense."

There is no defense.

But there was a defense. Peter Reading had his clue. He found it in one fact.

'We're trying to fight against our own weapons.'

Those words, spoken innocently, shook him to the very core. They wiped away a lot of the bewilderment in his mind. After the others had spoken, he addressed the meeting.

"GENTLEMEN," he said in part, "Such peace as we have enjoyed for so many years, can only last until a powerful outside force breaks into

our balance of life. Some time ago, a group of men from Circ visited us. They came with peaceful words, but they learned some great secret from us. A secret that enabled them to turn about and wipe us from the Planetary System. They are a small, inferior type of human, with poor brains and no imagination to speak of. They are perfect imitators. Once before in history, mankind was almost beaten by such a race."

It was clear to most of them, that he spoke of the Earth wars, and the animal like Japanese people.

"We know that they are winning the battle by using equipment identical to our own. There must be a solution. I'm going to continue searching for it."

"But how long can we afford to search? How long do we have left?"

Peter Reading shrugged.

"I've always done my best," he said. "I'll continue to do so."

He left the meeting alone. It hadn't occurred to him that his attitude might hurt him. He felt strangely as though the weight of the entire human race was on his shoulders. He wasn't far from wrong.

Ten days later he asked for a transfer to Pluto. He requested and was given full power over all military matters at Reading Field. However, heroes are soon forgotten as such, when they do not continue to produce miracles. Men were detailed to follow Reading and make sure that he was not selling plans to the men of Circ. Major Robbin, in charge of Reading Field, Pluto, got instructions to watch Reading carefully and make sure he did not escape to Circ. The entire situation had been rather strained. Robbin didn't like it. To that old timer in the Rocket Force, Peter Reading was still very much a man to be admired.

No one questioned Peter Reading directly. Most every man on the field

was bitter toward him. Most of all, Captain Red Warren nursed his hatred until it seemed to Warren that the dried up, partially bald little Reading, was directly responsible for the war that had snuffed life from his best crewmen.

Warren was seated, this afternoon, in the comfort of Major Robbin's office at Reading Field. Peter Reading came in. Warren greeted him coldly, but Major Robbin arose and brought a chair for him. He seated himself behind his desk again and stared questioningly at Reading.

"I think I've found something important," Peter Reading said.

Robbin said:

"Lord, Peter, I hope so. We haven't ships enough to protect this port for more than another month. After that, the whole system will be a pushover. There is nothing beyond Pluto to stop them."

Warren hadn't spoken. He was thinking of Rex Barren, his navigator. Barren was dead. Blasted clean out of his cabin today. The shot had missed Warren by inches. Warren wasn't thinking very kindly of Peter Reading.

"I've gone over the enemy reconnaissance ship carefully," Reading said. "I think we have the solution."

Red Warren stood up.

"If you'll excuse me, Major," he said stiffly, "I think I'll turn in."

Robbins looked at him curiously for a moment, then said:

"By all means, Warren. We'll see you in the morning."

Warren went out without speaking to Reading. When he was gone, Robbin said:

"The boy is badly hurt. His best friend died today."

Reading nodded.

"I know. You think, perhaps, that I'm a pretty heartless man. That I

think only of a scientific approach to these things. You see, Major, I must not allow myself to think of the human side. If I did, I would never be able to remember anything but crushed, burned bodies. The bodies of friends. If I keep my mind clear of those things, I may be able to save thousands of lives."

Robbin nodded. He thought he understood Peter Reading. He thought that Peter Reading came pretty close to being someone rather wonderful—and perhaps, almost immortal.

"You mentioned that you may have found a solution to our problem," he said. "I won't pretend to understand how you found anything of value in that captured ship. I'd like you to tell me."

Peter Reading nodded.

"I found it impossible to understand," Reading said, "how the man of the Green Planets were copying our ships so faithfully. I was sure that they *were* making copies, because they haven't the imagination or brilliance to match our work."

Major Robbin nodded. He was determined to understand all he could.

"They have attacked us with thousands of our own space ships and modern weapons," Peter Reading continued. "Yet they have no large factories or mineral deposits. At least, no deposits that have been worked to any great degree. There had to be another explanation."

Robbin said:

"What is your answer?"

"Duplication," Reading said slowly.

Robbin thought for some time before speaking. Then he shook his head.

"That can't be the answer. Duplicating our work would still demand large factories. We have discovered none, either above or below ground."

Reading was leaning toward him, hands clasped in his lap. For the first time his pale eyes were shining.

"There are other forms of duplication," he said. "Come out to the ship. I think I can convince you."

THE cabin of the enemy reconnaissance ship was tiny and crowded with equipment. In the center of the room was a large, rectangular steel box, with a six-inch lens peering from the front end of it. Reading bent over the box and pointed at the lens.

"There is our answer, I think," he said.

Major Robbin frowned.

"I don't understand. All reconnaissance ships are equipped with cameras. This is larger than the usual type. The lens is aimed through the forward port. When the ship dives at an object, the camera records the process, and pictures each step of the approach."

Reading said:

"That's the whole explanation," he said. "These ships have photographed all our war-ships. They have been recorded inside of the camera. Now—notice the construction."

On his hands and knees, he removed the side of the box by taking off a few clamps. Robbin knelt at his side. The interior of the box was full of racks. Each rack was about four feet square. There were more than a hundred of the racks, each of this measurement, and about two inches thick. Reading took one of the racks from the box and pushed his finger through the millions of microscopically thin sheets that hung inside the frame. He passed the rack to Robbin.

"A new type of photograph, I think," he said. "One of these plates, with one film, would do the trick. These films have been cut down so thin that you can't count the number of them in *one* rack. That would mean that you have a picture reflected through the lense, against, *or through*, all of these millions

of tiny sheets of film. Each one has a coating of emulsion."

Robbin knew there was something here he needed to know. What, he couldn't guess. He realized that the camera was entirely different than any he had ever seen before. Just what was the purpose?

"Look at it this way," Reading explained. "You don't have a single picture recorded on one sheet of film coated with silver-salt. Instead, you have millions of pictures, recorded on all these films. The result? Suppose this camera will not only record the outside of the ship, but will produce a three dimensional photograph, so that every last detail of our ships are recorded in that chamber?"

Robbin's mouth opened slightly. His eyes grew large.

"The recording of an actual space ship?"

His voice was no more than a whisper.

Peter Reading nodded.

"We've already mastered the art of three-dimensional still photography. They've copied that method, and added something not entirely new. Something I should have thought of a long time ago. The lense is of an X-ray type. It photographs everything, including the interior of the ship. *Including the actual machinery and instruments that run the ship.*"

"Reading, you don't mean—that?" Reading nodded.

"The photographers of Circ are capturing our ships on these devilish films. When the films are developed, they have true to life replicas of our fighters. *A ship in a box.* A tiny fighting ship filled with all the necessary detailed equipment. From then on, it's quite simple. You know the theory of atomic enlargements, don't you? You have read 'Pawler's Story of Atomic Enlarging'?"

Robbin nodded. He looked stunned.

"Pawler succeeded in blasting small objects up to any size he wished. He increased the atomic size of any existing article. He blew a tea cup up to the size of a church dome. He enlarged a fly to elephant proportions."

Robbin shuddered.

"They didn't dare let Pawler go on with his scientific work. It was dangerous."

Reading nodded.

"But copies of 'Pawler's Story of Atomic Enlarging' are still in circulation. So, you have the camera that will produce a replica of the ship, and the atomic enlarging theory to produce life-size ships of war."

He shrugged.

"Is that the answer?"

"I don't know," Robbin said. "We could try the machine."

Reading shook his head.

"I thought of that," he admitted. "I've opened the machine. The film would be spoiled. There are no more racks of the film on the ship. We haven't anything as fine. I imagine that the captains of these ships were not trusted. The cameras were loaded at their base, and unloaded when they returned. A clever race, Robbin. Perhaps they can only copy, but they've developed the process beyond our worst nightmares."

"And yet, I'm sure, now, that that's what they're doing," Robbin said suddenly. "What is the answer? How can we stop them?"

Peter Reading was already busy, removing the other plates from the camera.

"I think I *have* the answer," he said. "At least it will cost only two more lives to find out."

ON THE following morning, Major Robbin told Captain Red Warren what he had found out. The Major

didn't usually confide in his men. Red Warren was different. They had been friends long before their rank brought a certain line of respect between them. Over coffee, Robbin told what had happened last night. When he finished, Warren shook his head.

"I don't know," he admitted. "I don't like Reading. Maybe he's okay, but I'm a fighting man. I can't forgive him for leaving us in this spot. We weren't prepared. Men are dying because of that. Maybe he's clever, but . . ."

Robbin leaned forward.

"Red, you're wrong. Dead wrong."

The stubborn look came into Red Warren's eyes.

"Sorry, Major," he said, "but Reading isn't big enough to fight this war alone. I, for one, won't wait for him to figure out the answers.

"It's still an army of fighting men, and I can admire them, dead or alive. Reading couldn't lift a hand to fight. He's always preached peace and goodwill. Now that the dogs have turned and bitten his hand, Reading's just a befuddled, exhausted old man who's trying to hold on to his fame."

They didn't talk much after that. They were old friends, and Major Robbin had no intention of breaking up that friendship. Let Warren keep his opinions.

The ship that had been captured from Circ, was rolled out of the main hangar. It looked no different, for no detail had been changed on the exterior. Inside, it was not the same.

Peter Reading had dispatched three of the speediest ships to earth. There, they had submitted a long list of supplies to one of earth's largest hospitals. Ten men were detailed to work with Reading. When the supplies came, the interior of the cabin had been dismantled. Peter Reading worked mostly

alone, but certain heavy jobs were given to his men. It took a week to manufacture the complex machine invented in Reading's mind. For any other man, it might have taken a century. The idea was the thing. The mechanical work itself was only a matter of time.

Reading was beginning to show certain faith in his work. Major Robbin saw that lurking smile on the old man's grey face. He liked the smile. It proved to him that Peter Reading was not entirely a fool. Reading still had great power in that brain of his. Power that was capable of overcoming other men—even a nation of them—if it was put to good use.

AT MIDNIGHT, Peter Reading sat alone in the cabin of the re-converted ship, waiting for the man Major Robbin had promised to send to him. No one else was to be involved. If it failed, Reading wanted only one man to go to death with him. That was the last decent gesture he could make.

Captain Red Warren opened the cramped hatch, and bending over, came in. He straightened and saluted Reading.

"I understand that you are Captain, sir," he said quietly. "Major Robbin sent me."

Peter Reading didn't like it. He didn't like the combination he and Warren made. Warren disliked him. He would rather have had another man. Someone he didn't know. Someone who would obey his orders, and not question him, even in thought.

"We are ready to take off at once," Reading said. "I'm afraid that you're taking a long chance, Captain Warren. I hadn't expected Robbin to send you.

Warren went to the control board, looked it over for a moment and sat down. He strapped himself into the control post. Over his shoulder, he said

in a quiet voice.

"Would you prefer another man, Sir?"

Reading hardly knew what to answer.

"I—I don't believe there *is* a *better* man," he said. "I—that is—I have had the impression that you didn't like me very well. It's a lot to ask of you, making this trip."

The hum of power tubes sang softly in the hold of the ship. The rear tubes started firing spasmodically. Warren said:

"I'll do the best I can. We've all done the best we could. Death is one of those things. When you see your friends dying, you have to place the blame on someone."

Reading was working over the apparatus in the center of the cabin. It looked like a much larger version of the reconnaissance camera. The lense projected three feet from the box. It had a series of several lenses. Reading said, without looking up:

"And you feel that you have every reason to blame me?"

Warren sighed. He pressed the last series of firing knobs, and the ship, held back by the huge brakes, shivered under the impact of the tubes and tried to break away. Warren said:

"Peace is a fine thing, Sir, when men don't go to extremes. I believe in being prepared for the worst. The worst possible thing happened to us. We were caught without weapons to fight back."

"But . . ."

Reading didn't finish what he was going to say. He moved slowly toward the co-pilot's chair, laced himself into it and ran his hands over the control lever that were attached to the box-like affair in the center of the cabin. He said:

"When you are ready, Captain Warren. We will proceed directly toward Circ. We will contact the first enemy

patrol without delay."

Warren shot him a sudden, frozen glance.

"The old fool is going to deliberately commit suicide, and I'm going with him," he thought.

"Here goes nothing," he said aloud, and released the brakes.

TWO hours from base, Red Warren had mastered the strange controls, and although the ship responded like any tramp freighter, he managed to nurse a lot of speed from it. Since they left Reading Field, Warren hadn't talked. When he took a quick glance at Reading, the old man seemed perfectly relaxed and without fear. It puzzled Red Warren. He had expected Reading to sweat it out. On the other hand, he thought, the old boy didn't get frightened that other trip out. Maybe all the fear of death had been washed out of him with age.

"I understand that we are to act as decoy for the fleet," he said suddenly. "It's none of my business, of course . . ."

Peter Reading actually chuckled. The sound startled Warren. I wonder, he asked himself, is he human after all?

"We aren't a decoy, Warren," Reading said slowly. "*We, you and I, are going to go to war against the enemy fleet.*"

This time Warren turned in his seat and stared at the dried up little scientist. Reading's eyes were twinkling. Warren could have sworn that he was enjoying himself.

"I-I don't understand."

Peter Reading's grin disappeared. His face was sober again. His hands were in his lap, clasped, fingers rigid.

"Red Warren," he said, "I know damned well you don't like me. I don't blame you for not understanding. Listen to me for a minute, and then think what you will. I am a research

scientist. I am no more than that. Many years ago, when I was as young as yourself, hot blood in my veins made me want to fight at the drop of a hat. Later, when I saw what war did to my people, I worked every moment of my life to prevent that war. I succeeded for a long period of time. A *very* long period.

"I couldn't foresee another planet system breaking down my work. When it did, I was caught short. But, remember this. For many years I was looked upon as a very great man. I didn't ask for glory. It came in spite of my wishes. You can't condemn me for that.

"You condemn me because your comrades are dying. Try to remember that many millions more would have died if I hadn't prevented war for so long."

He wiped thin fingers across his forehead and went on speaking.

"Now I'm a suspected spy, an old fool, and a busy-body who can't produce miracles. Haven't you ever stopped to think that it's pretty hard for one man to take the whole load, even when he has been able to do it for the major part of my life?"

Red Warren didn't answer. He stared straight ahead. Circ, its dark outline already visible in the dim light of the green moon, was blurred in his eyes. His head ached. He wanted to say something, but he thought of Rex Barren, and how Rex had died, and he couldn't talk. Not yet, anyhow.

"Straight in toward the main anchorage on Circ," Peter Reading said abruptly. "We're pretty close to the end—or the beginning, of everything, depending on how we handle this."

Red Warren thought he rode with a maniac. Two men could never face the intense power of a modern space-anchorage, but at least the maniac was a *man*, for all his talk. The maniac, Peter Reading, had more courage and a different kind of courage that Captain Red

Warren had ever seen or heard of.

His lips pressed into a tight, bloodless line and he played with the control knobs. The ship caught the down-leg of the trip and went sailing swiftly straight toward a death of liquid fire.

FIFTEEN minutes—twenty. Warren's hands were no longer shaking on the controls. Down below, somewhere beyond that cloud-mist, the whole Circ fleet was laying at rest. Thousands of huge battle-wagons squatted. Death-snouted monsters, waiting to blast into void. Huge rings of fire-cannon waited for the delicate ears of the radar-reflex to fire them toward any approaching ship.

Warren wiped sweat from his forehead. He said:

"Fifteen minutes. We'll be in range in five."

Peter Reading looked at the man opposite him, and suddenly saw only a frightened boy. He saw a boy who would face death if he had a fighting chance, but couldn't stand the pressure of death without a chance to strike back.

"Red," he said gently.

Red Warren turned and looked at him. His face was set. His teeth were grinding together.

"Leave me alone," he snapped.

"Red," Reading said insistently. "I'm an old man, but I'm not a fool. Remember that courage of yours, Red, for just a little while longer. I'm not letting you down."

It was the first time he had ever called Warren by that name. Warren seemed to realize that there was suddenly a bond between them. A bond that he had to cling to, and have faith in.

"God damn it," he said suddenly, "I'm either a fool, or I'm riding with the Almighty himself."

He managed to grin.

"I'm okay now," he said.

Below them the first ring of defense shot upward in a circular, mushrooming crimson blaze.

"Ten minutes, Reading," Red Warren said. "Ten minutes to hell. Where do we go from here?"

"Straight down."

The firing was closer. The void below was a solid mass of flame. The fire-cannon were covering every single inch of the approach. Between blasts, through the telephoto view-glass, Red Warren watched the vast circle of ships, crouching, waiting. Here was power. Power you couldn't face without flinching.

"Now," Peter Reading said.

There was so much expression in that single word, that Warren jerked around, watching.

Peter Reading's hands were moving swiftly. Moving across the bank upon bank of switch controls. His fingers played magic, and yet nothing happened. Nothing, except the box in the center of the cabin started to hum loudly. There was no light. There was no weapon blasting downward toward the enemy anchorage. There was—nothing.

"Look down, Red," Peter Reading said quietly.

Warren had almost forgotten. With sudden fear, he looked down at the enemy anchorage.

Only there wasn't an enemy fleet there any more.

They were close. Five minutes would bring them into the anchorage itself, and every detail was clear. He rubbed his hand across his eyes and looked again. Instead of the enemy fleet. Instead of the vast array of fire-cannon—there was—*nothing*.

Peter Reading hadn't done *this*. No one but the greatest power of all could

do *this*.

The anchorage was devoid of ships. It was a flat, graded piece of land, without a blemish on its smooth surface.

"Good—Lord," he breathed.

THE ship didn't land gracefully. All the grace had been torn from it many years ago. It landed drunkenly, side-slipped and half turned over on its side. The lights went out. The old ship lay there, two men in its cabin, like a final marker for a space-ship graveyard.

Peter Reading helped Red Warren out of the ship. Red Warren's arm was broken and his ribs were caved in. He had fallen against the control board when they rolled over.

He felt good, though. He felt swell. He waited patiently, his back stretched against the ground, while Reading bandaged him and put splints where they should be. Then he was still, while Reading found the radar-reflex and contacted Reading Field on Pluto.

They sat side by side, Warren's back braced against the ship, and Reading explaining what had happened.

"You know about the duplicates," Reading said. "Major Robbin told you about those. The duplicates were solid enough. They were controlled by the men of Circ. There was one flaw in the plan. One flaw that I took a long time to fathom!"

He saw the look of pain on Warren's face, and helped him find a more comfortable position.

"A photographic emulsion was necessary on all those films. The atomic structure of the ship was fairly complete, save for one detail. Ninety percent of each ship was made up of that emulsion. It was in a hardened state, but the qualities were still the same. Silver-salt.

"If you put film into an envelope and subject it to the X-ray, the emulsion

will be destroyed."

Warren was trying to understand. He still thought that Reading was producing miracles. He still worshipped Reading, not as a man, but as something immortal.

"It wasn't difficult," Reading said. "Once I had the problem, I had the answer. A super-powerful X-ray that would exercise its power even over a long distance. Train that huge X-ray-eye upon these ships that were no more than a solution of solidified film, and you would destroy the emulsion, *and* the ship itself."

Warren shook his head slowly. He grinned.

"Maybe I'll get it, when my head's clear. Maybe I won't. Maybe I'll *never* get it. Anyhow, you made positive—negative, and that's enough for me. I don't figure you'll ever for-

give . . ."

Reading smiled.

"Perhaps I've justified my right to live. I figured that was pretty important. I—sort of like you, Red. You've been a good fighter all the way through, and I'm grateful for your friendship."

They sat on the deserted field where a huge enemy fleet had been anchored only an hour before. They watched their own ships come blasting in confidently, for a landing.

There was a light shining in Red Warren's eyes when the first patrol landed and slipped up toward them in an even line, like great killer whales.

"There's nothing negative about *that* picture, Pete," Red Warren said warmly.

Pete Reading knew what the boy was trying to say.

THE END

WHEN THE GYROSCOPE FIGHTS THE FLYWHEEL

By

H. C. GOBLE

Some interesting thoughts on gyroscopes and flywheels

FOR years the gyroscope has been a work-horse for mankind, guiding and stabilizing his vehicles and ships, and serving as an incorruptible standard of direction that operates without reference to factors we consider stable. Yet in all the years since Foucault invented the gyroscope, little effort has been made to exploit the gyroscope's more fantastic possibilities.

Basically a gyro is nothing but a flywheel on a shaft, with the greatest concentration of weight on the rim of the flywheel. The flywheel is balanced on its end bearings so as to turn with a minimum of friction. This basic unit is then mounted in concentric rings so that the flywheel as a whole is free to swivel in any direction. That's all a basic gyro is. Yet it produces phenomena bordering on the miraculous.

With the flywheel in motion, the gyro is subject to several forces normally. Its primary desire is to remain with its axis in exactly the same position as it was when the flywheel was brought up to speed. So determined to maintain this position is the gyro that the ten pound size can defy the full muscular strength of a two-hundred pound

man trying to deflect it from its original position. Several amusing stories came out of World War II concerning pilots who carried battery-powered gyro units from robot-pilots and compasses about in suitcases.

The pilots would check in at a hotel and hand the suitcase, its little double-gyro whirling, to a porter. When the porter would attempt to round a corner the suitcase would have none of it, and would refuse to go any place except the direction in which it was first headed. Should the porter try to tilt the bag in carrying it up a stairway, the other coaxial gyro would come into play and the suitcase would immediately fly from the porter's hand.

This force operates in a plane parallel to the surface of the flywheel. The gyro can be moved with no difficulty in any plane of the true vertical or horizontal, as long as no effort is made to change the planar angle of the flywheel.

But however great the power of the gyro, other forces are greater. And when a force is powerful enough to move the whirling flywheel out of line, the gyro is so annoyed that instead of moving di-

rectly away from this greater force, it moves at right angles to it . . . a stubborn compromise called "precession." A weight hung on one side of a gyroscope's frame will cause "continuous precession." The weight represents a constantly applied force, and since the gyro axis will move only at right angles to the force, with the weight applying a continuous force the gyroscope will counter by moving in a continuous circle.

This defiant attitude of a gyro is what makes its use in a compass possible. The rotation of the earth on an east-west line annoys a gyroscope very much, but the earth is a hefty customer to huck, so the gyro seeks the line of least-resistance and swings so that its axis parallels that of the earth . . . a perfect north and south pointing, independent of magnetic fluctuations, hidden minerals, electrical machinery or electric storms.

But if the axis of a gyro is placed at right angles to the earth's surface, and the gyro is so confined that it cannot assume this north-south position, it will remain in its original position while the earth rotates. In other words, a little world of its own, it will complete a full rotation in reference to the earth's surface in each twenty-four hours . . . the most perfect clock in existence. It does not matter what position the flywheel is in when the clock is started . . . it will do its twenty-four hour flop-over in exactly twenty-four hours. And if the earth slipped a cog and did it in twenty hours, the gyro would likewise complete its rotation in twenty hours.

This makes a trick or so necessary in using the gyro in a robot-pilot. It is obvious that on a flight of several thousand miles with coaxial gyros a plane would end up as far towards outer-space as its motors would carry it . . . for the horizontal gyro doesn't give a hoot for the earth's curvature and will willingly guide a plane on a perfect tangent toward the stratosphere . . . so in one application a U-tube of mercury is fastened to the gyro frame. The liquid metal abides by the law of gravity even if the gyro does not, and the mercury gradually fills the tube section toward the nose of the plane, and empties from the section of the U-tube away from the nose of the plane. Finally the weight of the forward tube section is great enough to nose the little gyro down into conformity with the earth's curvature . . . and the logical "precession" that would thus occur, is prevented by the gyro being firmly hindered from any escapist effort to seek a right-angle to the force applied by the liquid.

IT IS probably plain by now that the inertial properties of a gyro have some wild possibilities, when one considers the results of pitting one gyro's force against another's, or against the earth's rotation. Only once in sciencefiction has this idea ever been tackled as a means of beating gravity. That veteran sciencefictionist, Hugo Gernsback presented the idea in the 1920's in a novel called "Ralph 124C41."

It boils down to the fact that when two or

three gyroscopes on a fixed frame are trying to do something different simultaneously, while the earth's rotation throws in a fourth factor . . . something has to give. By the laws of inertial forces governing gyros, and the law of the earth's rotation acting against gyros, certain combinations of gyroscopes on a fixed frame must either rise vertically or maintain a status quo . . . and they can't maintain a status quo.

Consider the fact that the gyroscope mentioned previously must make an independent rotation once every twenty-four hours. Now, with a rigid framework couple another gyroscope a few feet from it. Each gyroscope must follow out its law of making an independent rotation in twenty-four hours. Each flywheel is turning at the same speed. Yet neither can make its individual rotation without lifting the gyroscope of equal energy at the other end of the frame, which in its turn is trying to make its individual twenty-four hour rotation. Yet in their effort to buck the earth's rotation both are expending energy, which must be expressed in some way short of buckling the frame in the middle. Obviously they cannot change the plane of the framework without changing their own relative positions. They cannot dig into the earth's surface. Their only logical escape as the earth rotates, is to rise UP, as long as the circular forward force of the earth's rotation is applied against them.

Well, you say, even granting that possibility, as soon as the framework is clear of the earth it is divorced from its source of rotational energy and will settle back to earth as soon as it loses forward speed. But remember, every object on the earth's surface has an automatic rotational speed of about 1000 miles per hour whether it is fixed to mother earth or not.

"Precession?" Well, if you figure that instead of rising UP your gyro frame will do a right angle twist and fall over on its side, merely add a third gyroscope whose flywheel is perpendicular to the other two flywheels, and at right angles to them. This will block any right-angle effort of escape for the other two.

Or apply precession itself if you want to. Connect a pair of gyroscopes to each end of a shaft, so that the shaft is hung on the inner rim of each gyro frame. The flywheels will be placed parallel to the earth's surface. The weight of the shaft results in a continuously applied force against the inner side of each gyro frame. Result? "Continuous precession!" Each gyro will attempt to move at right angles to the applied force, in other words each gyro axis will attempt to turn in a direction parallel to the shaft. But to do this, the front set of gyros and the back set will have to move each other, since they are all connected to the shaft . . . and since their forces all equal each other, the only way the energy can be applied is UP. Like the man with itch at a banquet, they can't move and they can't sit still, but they gotta do something. It might be worth trying anyway.

FIRST ROCKET

by D. RICHARD SHARPE

There it was before him—the first ship to fly through space! And he was to be the first to travel the void . . . or so he dreamed

JOHNNY MILTON stopped by the wooden fence around the big new airfield. The sky was aflame with sunset—and waiting for him, outlined black against that far sea of flame, was the ship!

Stark against the sky, a bold, revolutionary creation—a vast bulk of mystery and cold steel.

To him it was given. Of all the men who would have given their good right arm for the chance, fate had selected him.

In that man-made monster lay the terrific power of the new atomic motor, leashed against the hour of release.

And he, Johnny Milton, must enter that fireborn mount and ride—where

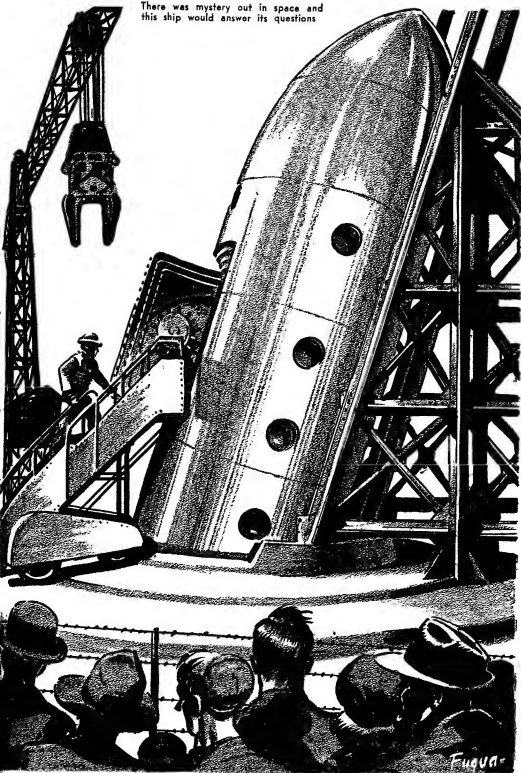
no man had ridden before.

Out there the only things that lived were fear, or the alien races of the legendary Gods, or ethereal beings too tenuous to approach the dense earth air.

He was to flash skyward from this earth at a precisely calculated minute and hour and day. Once free in space, shut off his power and fall, fall toward the sun. Earth would race on ahead and Venus, in her faster orbital speed, would approach him at the precise time his own orbit, compounded of earth's own orbital speed and the attraction of the sun and carefully computed blasts of power from the jets forward—coincided with Venus' sweep around the sun. It was all very clear on paper—



There was mystery out in space and
this ship would answer its questions



but standing there looking at that terrific ship pointed at the mystery of the star-strewn void overhead—to Johnny Milton it was not so clear that they all knew what they were talking about.

For out there would be no homes, no lights of fires from little warm windows, no little thoughts of little men around to make him one and safe with them. No nothing, out there, but more space.

His imagination pictured all the immeasurable dangers such as men talked of in space and wondered what might await the first to challenge that vague and threatening emptiness—force winds that blow curiously in vast whirlpools of pressure where gather in a deadly crush of force a Sargasso collection—and the first ignorant voyager to approach. He wondered with them whether that first trapped ship within such a whirlpool would find there like flies on flypaper the long forgotten ships of other races of space.

HE WANTED to go to, like all those other males in whom courage rouses to life a mighty lure, beckoning always to the far places.

But, somehow the siren of space had for him rather cold and empty arms, the vast emptiness above roused him, challenging him, and repelled him, all at once.

Still to him it was given. Feeling like Casey Jones, he mounted to the cabin port, closed the lock by the big vacuum pump by which it could be opened in space. He placed the course charts on the plastic desk of the cabin that was the bridge and control chamber and whole heart of the ship—he pulled the cord that signaled all clear to the waiting mob outside.

For that moment of time so difficultly determined by so much mathematical virtuosity had at last approached—was staring him in the face from the watch

on his wrist, from the time piece in the elaborate mystery of the instrument panel.

The ship of beauty, the product of so many men's life work—of many, many proud workmen doing their very finest—that to him was also a vast pile of steel and alloy and little-understood power and danger and a shaking, thrilling chill that electrified his spine with something that was both worship and fear and terrific lure—that ship blasted upward on a pillar of flame. And Johnny Milton with it, willy-nilly and irrevocably.

Men's eyes watched the bright pillar that disappeared so swiftly, and women watched, and all breathed a prayer to the dark Gods that men feel above, at times. Then they all went back to their warm little homes, the newsmen to their typewriters, the policemen back to their beats—and Johnny Milton went on into the mystery alone.

CHAPTER II

JUNGLE. Rain. Broad elephant ears of leaves dripping, soft black muck streaming, wet, ground mist slowly rising against the gray solid beat of the rain. Rising like a vague, layered ghost, lost among the mighty trunks of trees that, like Redwoods, out-top the puny buildings of men's mightiest work.

Velva Turua was fed up with rain. The thatch leaked, everything in her home was slimy with a film of water that would not go away.

Her night-black hair, aureoling her lovely, young, fawn-brown face with a great ball of ringlets, was always moist and too heavy these days.

Four little round cicatrices, in a diamond pattern, marked her forehead for those who knew her as one of the Dancer's Caste from far off Jonada.

She thought with nostalgia of her life

as a slave girl in Jonada. Of being bought by the Secret Ones, and her surprise to learn that work and hunger were of the past. For now she was to be a dancer, and dancers are privileged people in Jonada.

Well fed and sleek, the long hours of her full day had been spent in training, training, day after day. She could dance, could Velva. She knew that well. Did not men worship her, throw many coins to her master when she danced in the drinking places of Jonada, the greatest city?

Her lips were firm, full, sweetly curved by Mother Mia-Vena to attract a man, to bring more children to serve the mother's spirit. She knew her name, Turua, meant "the Untamed Heart." That had been her mother's name, too.

Smooth, pale and delicate, her skin. Supple and adequate the dancer's muscles that moved under it.

Sharp her eyes, and vivid and heated the thoughts that moved behind them.

For now she thought of the rites held to the horrible God that Sinon kept in a pen.

That thing was more terrible to her than death itself.

For now her thoughts were of the savage man-creatures that had leaped from the trees as her master traveled homeward in the darkness to his plantation, Mandara, the "Place of Happy Slaves."

The man-creatures had seized her, borne her from the master's carriage, leaped again into the protecting trees. They had brought her swiftly to this place in the jungle.

The dancing girl who had served as their priestess at the rites to their living God had ventured too near the God, and had been eaten. Therefore they had stolen her, Velva Turua. Velva snorted, to think of it.

Now she danced the ritual dances,

and loathed her captors. For those fearful rites she was the lovely prelude—to provide the proper contrast of beauty and rhythm and meaning to bring out the horrible flavor of the fear of the God to the full.

Vividly in her mind moved the picture of those rites, the last time, when Soloa had died—died stubbornly refusing to Sinon, the magic-man, any pleasure in her death.

Velva's face twisted in revulsion as she thought of the gross limbs of Sinon, corded and twisted, lumpy and powerful, of the drooping ugly lips, the long yellow teeth—leering, laughing and mumbling his phrases of fear to the God.

The ring of savage faces that were his people, sitting and waiting and relishing every moment of the wonderful, fearful entertainment Sinon always provided for them.

OF THE young sweet face of the victim, captive maid, brought home from a raid. Like herself, thought Velva, and only that they knew she was a dancer and had stolen her for that had kept her from being in Soloa's place.

Of the red drops that were Soloa's life, oozing slowly out and blackening on her bruised flesh.

Of the screams the girl should have screamed that sat in her eyes and waited for release. . . .

Still the God-thing tightening about her, slowly, hungrily.

Sweat came on Velva's smooth brow, just thinking!

In her mind still that young smooth body writhed, twisted, trying, always trying. For her body did not think or know there was no way to live.

But her mind knew, and watched it all, screaming silently from her eyes.

Sinon, whose power came from the fear of the God, watched it all, smiling,

for he enjoyed these little ceremonies infinitely. Every faint rustle of her soft young skin against the rock was music. The soft, sweet smell of her sweat of horror. The faint gasps that grew louder and louder as her body involuntarily struggled, and her will fought to keep the gasps from becoming screams, for she hated Sinon and would not give him the pleasure she knew he enjoyed. The dry gasp and suck of the fleshy, liana-like arms about her, the God, a plant-beast, slow-crushing,—all this was the most desirable thing in life to him.

The captive would not give any sign of her torment or any scream that she could help. And Sinon had grown gradually more and more angry with her for not properly struggling and screaming, for the fear was leaving her eyes as death came, and she smiled at Sinon, robbing him of all his joy. All that was music to his ears she kept from him in the end, and Turua joyed to think of that. The captive was brave, and she was beautiful. Tears came unbidden to Velva's eyes; she shook her head. It was wet enough without that. She wished that girl had been her sister. She had never had a sister.

The great flaming thing screamed now, suddenly driving in upon her thoughts. Velva Turua ran out from her house into the rain to look up at the scream and the flame of the thing, of the God, no less, that was falling from the sky.

Flames shot from the bottom end, and it spun over madly—flames shot from the other end, and it spun over again. Surely this was the end of the world, the death of Mother Mia-Vena herself.

With a vast hissing, the flaming, dying God, flying down from the night skies, fell into the jungle; she could see it, glowing redly not far off.

SHE ran toward it, fighting off the grasping vines, struggling through the sucking mud, beating away the branches that clawed at her. She felt the heat in her face. She stood watching the little flames licking over the great round body of the new-come "God."

Velva got down on her knees and made a little prayer to the new God from the skies. The tiny licking flames died out, and the thing lay glowing redly with the life that was dying in it.

Now a great round opening came suddenly in the side of the monstrous God. Through it stumbled what looked to Turua very much like a man.

About her now the dancer felt the pushing, curious bodies of the savages who kept her here for the ritual dancing. And a fear for the man who stumbled blindly out of the round red glow, stumbled toward them weakly, fell in the thick mud, rose and came on toward them.

Fear came in her then for the man, for he was not a God. A God is never a mere man. She knew that. But perhaps he was a priest for the round, red God. The red God that was turning black even as she looked at it.

The quick mind her mother had given her leaped to answer the fear for the strange man-thing, and she ran forward, stooping over him, helping him to his feet—crying—"Help the Man-God! Help the Man-God who brings messages from the great ones of the skies!"

And the savage, naked bodies moved forward with her, their wide slack mouths open in wonder, and helped her carry the stranger to her home. And Velva Turua was glad that she had saved his life. For surely they would have killed him if they had realized he was not a God.

Velva took off the smouldering, charred things he had wrapped around

his pale white body, washed him with water, gave him food. The stranger slept.

Sinon shambled into the thatched house, squatted and watched her. Sat, and looked, and thought.

His face was even grimmer and more evil than ever. Somehow Turua knew he was planning the death of this "Messenger" of the "Gods" that his subjects, his dupes, were excitedly prating of. This pale, white, weak thing who had come to take all his prestige away.

This strange God would take their child-minds from the worship of his God, and he would be powerless. This pale stranger would take his place; the people might drive him out into the jungle to die. That must not happen.

The stranger must die. There were many ways to kill a man. This was only a man. Sinon knew that as well as Velva.

Rain. The slow rising mist. The glowing Sinon, watching the sleeper's long white body on the wooden sleeping platform.

The slow rise and fall of his chest. Velva's eyes rolling, showing the whites, in her awe of the new thing that had come so suddenly, so fearfully out of the sky. The waiting, waiting for the waking of the strange new force in their life. And outside, the round black body of the fearful monster waiting ominously in the jungle.

Sinon thought about that too. There must be great magic in it. Real magic, not like his own. To fly in the sky, to fling flames from its body—that was magic. To fall from the high sky and remain whole and in one piece, that was magic. It was surely a mighty magic this man carried in that round fire-beast.

Shivers of fear and apprehension, of indecision and doubt ran up his spine. That was not good. He must kill the

strange white man before. . . . Now! He must kill him now! Before he awoke and made everyone know his power and what magic he carried in the round thing of flames and mystery.

SINON got up, his bowed and twisted legs carried his thick ugly body toward the sleeper.

Fear for the sleeping white helpless body rose in Velva, watching Sinon. She rose, a lithe coffee-colored panther in the wet gloom. Her feet slithered softly as she picked up the wooden stool from behind her. Her eyes were wide pools of awe and fear for the source of that awe. Her soft aureole of ringlets a cloud of darkness around her head, her mouth a dark moist flower in the paler round of her face.

The savage tribesmen had gone to bed, magic and mystery and monster could wait—was better considered in the safe light of day. Sinon was watching "it"; he would tell them in the morning. There were two people only awake—Sinon, his dark heart plotting murder, standing and brooding over the sleeping white body of the stranger, and Velva, a dark lovely shadow behind him watching Sinon.

Almost she could hear his thought, "This stranger must die, he will destroy my power. His magic must be far greater than my own. He must die!"

Her fear of Sinon slowly dissolving in the heat of her anxiety and wonderful new interest in her life, Velva saw Sinon clearly as the horror she had witnessed so often in action at the rites. The horror that fed the captives to the creeping mass of sucking limbs and awful gaping mouths these dupes of his called "God."

Velva, moving now with slow, sure precision and swinging the heavy little wooden stool gently in her hand. Inch by slow inch she moved, nearer and nearer to the just as cautiously moving

Sinon, who was sliding his hooked and razor-edged blade from the leathern string of his breech-clout. Fear of the stranger's powers froze his hand in a deathly chill, but the same fear of his sleeping power moved his will that made his cold hand move on its death mission. The blade came free of the leathern belt, rose slowly, poised now above the white, slow heaving chest.

Velva swung hard. The stout wood of the stool seat thumped heavily. The sound was like the sound made by the great ripe nuts of the Amlar tree when they fell, striking the ground and cracking wide open. Even as the Amlar tree totters and falls before the great storm wind, so tottered the crooked, evil figure before her. Tottered and fell, turning slowly, and lay on his face. Still, he lay before her. Her heart pounded in her ears, loud as the sea's crash on the white sand in the great wind time.

Her heart ceased at last its mad racing. Velva stole softly to the door and peered out into the dark.

Tugging, panting, she dragged the ugly, heavy body across the wet ground. Across the compound, into the dark jungle, toward the great black body of the fearful sky-monster waiting there.

CHAPTER III

DAWN came smiling down at last, the slow rain ceased, the white ever-clouds rolled back for a wonderful, usual minute, showing the face of the Golden God of the far skies.

The naked white figure sat up and gazed curiously about him. The hands, shaking but a little, felt carefully over his body, looking for breaks, and finding only a few superficial burns.

Outside the jungle steamed in the sudden sun, the great elephant's ears nodded and glistened, the red and golden flowers smiled at the purple, dripping

blossoms of the nalna, nodding return.

The glory and strange beauty of a new world beckoned to Johnny Milton through the ragged opening in the thatch that was the door of the big hut.

Through that door returned now Velva. Her lovely legs were muddled to the knees, her gloriously lithe body weary, her eyes wide to see the strange man-God standing. Why did he pick up her *ninon* veil and hold it before him? And why did he laugh and act so foolish?

She got down on her pretty round knees, touched her forehead to the ground. She crawled forward toward him, smiling fearfully up at him. His laughter was hard to resist, and soon she laughed too, and stood up. It was hard to treat this one like a messenger of the Gods. Together they stood, laughing idiotically like children who meet for the first time.

She set out the Amlar nuts, the nonnie milk in a big wooden bowl, the long slim vanya fruits. He sat and ate ravenously.

"Beautiful, are you an angel or what? A body like yours would bring you mink and orchids on Fifth Avenue—at the very least you could marry a millionaire! Pass the cocoanut milk."

Velva laughed, her white teeth pearly and regular, her dancer's lithe arms beautiful as she handed him the pointed-at articles.

"Did you ever read about Columbus, beautiful? I wonder if the Indian maidens looked as good to him after that voyage as you do to me? I'll bet they didn't. They couldn't! You've got a special something—there's no word for it."

Suddenly he looked at a round queer face growing glitteringly from his wrist. "Beautiful, how long was I asleep? Conjunction doesn't last forever. I'm not to stay on Venus more than twelve

hours—and six are gone already. You wouldn't know about Hohmann Orbits, would you? Do you know, Beautiful, I only ran those rocket motors ten minutes in all? You wouldn't believe it would you? Science is wonderful!" Johnny Milton munched his food, full of wonder and talk—it didn't matter that she couldn't understand, she was a good listener anyway, smiling and nodding.

"Yeh, I coasted almost all the way, practically fell on you, didn't I? You must have been scared when the rockets blasted over you, you must have been plenty scared. I would have been, and I know about it. You know, baby, a Hohmann orbit is pretty near as much Greek to me as it is to you! The cold truth. If I don't get off within the next six hours, I'll have to stay here for two years and seven days. Two of my years. They're different, years, where I come from. Baby, I sure wish you could talk. You could tell me plenty. You know, that's a thought, baby, two years with you. But I'd probably catch Venusian hydrophobia! Yeh, I'm sorry, but I gotta go."

Far off, beyond the village compound, the writhing arms of Sinon's "God" reached endlessly for the food that was not brought today. It howled, an eerie, frightening undulation, and Johnny Milton shivered, wondering what Venusian horror made the sound.

The creature howled its vague loss of the twisted master that was not there, was dead! To hear it made a warmth grow in Velva, greater than her fear. Sinon would no more be there to feed it. No-one else would, she knew. Gods do not eat. They only suck up the blood of sacrifices. Maybe that was over now? It would be if she had her way! She would say to the people that Sinon had appointed her high priest of everything, of all the Gods, and that

Sinon had gone on beyond into the grey place where the dead wait for new life.

Frantically the stranger worked. Queer magic, thought Velva, watching him. Filling little boxes with mud, other little boxes with plants and leaves. Others he filled very carefully with nothing at all!

She watched him catch nothing in the bottle and carefully cork it. Maybe he was crazy? Poor stranger . . .

ALWAYS he looked at his little round face on his wrist. Water he put in the glass round boxes, lizards he caught, little minnows—and when she took him to the great pen of the God to show him that wonder that howled, he gasped and was very sick from his mouth.

Then she stood beside the strange God when he went into the round black thing lying await in the jungle. Stood watching wistfully, her lovely young face telling far more than words ever would. Gasped as the strange man, wrapped once again in more of the rough unpleasant wrappings she had so carefully removed when first he came . . . stepped out of the round shiny opening and took her in his arms. He did a strange thing with his mouth on hers.

Johnny cursed. "Now I've done it! Those techs told me not even to touch a native for fear of unknown diseases. But sister, they never saw you! You know, if I didn't know my history, I'd take you along back! But Pocahontas was never happy in England. You wouldn't be happy, baby, and you wouldn't be healthy. So it's good-by, beautiful, but it sure is harder than I ever thought. . ."

Johnny Milton went in again to his horse of fire—to mount the raging column of flame and ride . . .

Went in quickly, and the round place shut slowly in Velva's wistful friendly

face. A queer hissing made her start back in fright. Then a great fearful crackling flame from the end of the roundness made her run and run, away. Crying, was Velva Turua.

Out in space, Johnny Milton opened the long tool locker to get a fuse.

Staring up at him from the locker was a dark, sinister face—blubber-lipped, long fanged. Frightful still, in death, was Sinon!

Johnny started back—“What in the name of God!”

Closer examination told him much. The hooked blade still clenched in the big hand, the bloody crushed skull, the feminine finger marks on the wrists, marked in the blood—the story leaped at him. He had sensed danger in his dreams, knew vaguely that something had happened near him in the night.

“She killed that thing because it tried to kill me! There is an angel that watches over fools like me . . .”

Softly Johnny Milton’s voice repeated—“There is an angel, and she is coffee colored, with a dancer’s swift feet, and a smile like the pearly gates . . .”

Johnny Milton turned away from the edge of the flying field. That was only an old cargo-plane outlined stark against the flame of the sunset. It wasn’t any space ship! But the papers say atomic power will be soon out of the laboratory, and then space ships will be next—certain to come! Tomorrow or tomorrow, that will be a space ship waiting there!

Johnny took out his pocket knife, began to carve his name on the board fence. And *he’d be the pilot*, he would! WAIT AND SEE!

MAN'S HAPPINESS-GOVERNOR: THE LIVER

By A. PHILAETHIAN

So you are happy? Well, here are a few thoughts about your liver which ought to make you more so—or will they?

THE wise old saw “To know the brain, is to know the man,” can be paraphrased with much profit to read “To know the liver, is to know the man.”

After much struggle through countless ages, through eons of crawling—then walking through the slime and muck of Earth’s early existence, from being forced to stand on his own initiative and depend on his own abilities, Man has slowly arrived at the point where he is becoming a thinking animal. That he is far from perfect is readily admitted, but slowly his rational principle is becoming manifest. But contemporary Man is still far from the point where he is a 100% thinker; as he is now constituted Man more often *feels* his way through a problem than *thinks* his way through it. Someone once made the witty remark that “More men have been hanged because of a bad liver than because of a bad crime”; jurists, reputedly the best thinkers, often feel rather than think—and they feel because of a 5-pound mass situated immediately below the diaphragm and fitted into the base of the right lung.

Considered from any standpoint, the liver is

an important organ both to possessor and non-possessor. Physiologically viewed, the liver is not only important to life but is the *sine qua non* of metabolic existence.

Through the liver passes all the blood of the general circulation for two major purposes:

1. To be cleansed of toxic materials;
2. To have extracted from it the materials to be used for all metabolic processes.

Whether such widely divergent materials as spinach, tuna fish, or a malted milk is consumed, or one inadvertently “swallows his chaw of cut-plug,” the blood carrying the absorbed materials is filtered through the silent and highly efficient hepatic structures. In addition to the purely filtering function of the liver (acting in this way as a sponge that both *extracts* and *retains* the extracted substances), the organ has another equally important function: Converting the glucose brought to it (via the blood-stream) from the small intestine. The liver has three major functions, actually:

1. Filtration;
2. Conversion;
3. Secretion.

The liver's filtration-function is not its most important; the tri-partite hepatic functions are of equal importance. Filtration of the blood-stream (in the sense of extraction of liquid toxic materials) perhaps takes precedence over the others as extraction must be the best possible if efficient physical life is to continue. An efficiently filtering liver affords a clean blood-stream, at least in the sense of being free of metabolic wastes, and conduces to a general feeling of well-being; a clear head, sparkling eyes, a happy smile, and a "God's in His Heaven, all's right with the world" attitude is the direct result of a blood-stream that is not clogged and loaded with metabolic poisons, poisons that cause the "soured look and jaundiced eye." That Man depends upon the status of one of his alimentary organs for a majority of his creature-happiness is easily verified: The alcoholic "morning-after," with all its attendant headache, furry tongue, nausea, and pure physical torment is only the result of a congested liver—congested and unable to filter from the blood-stream the toxins (*ethyl alcohol and various ethers, esters, phenols, and cresols*) that were introduced. A perfect Pollyanna is changed into a raging Caliban when undergoing a "hangover"—the change results from the well-functioning liver (which causes a Pollyanna) becoming saturated with toxin-laden blood (which uncleansed blood is permitted to re-enter the general circulation where it irritates and poisons all the tissues that it contacts). Men who can drink "like gentlemen," i.e., swill like pigs but show no effects thereof, have this ability because of a highly efficient liver. Alcohol, after entering the blood-stream, is carried to the liver and, if the liver is physiologically competent, is rapidly changed into other relatively harmless compounds; It is also excreted unchanged through the kidneys after the blood-alcohol threshold is exceeded. Of course, a non-acting or decreased-acting liver permits the alcohol to circulate throughout the system and the symptoms of alcohol poisoning then appear—the well-known "boozy." The case of alcohol is not unlike, instances may be offered without end that any toxin that the liver does not filter from the blood-stream escapes into the general circulation and gives rise to many symptoms. The loggy, dull, torpid feeling so common in contemporary life is not nearly so much the result of living too fast as it is of eating too much and exceeding the filtration capacity of the liver. When Man is physically uncomfortable he is querulous, fretful, and short-tempered—he is uncomfortable mostly because of auto-intoxication; in this manner Justice, Wisdom, and Philosophy are dispensed in accordance with the donor's liver. That the Hatba yogis of India recognized this fact millennia ago is common knowledge; in a later time it is found that most of the Greek philosophical schools were in close proximity to a gymnasium.

A function of the liver that is extremely vital to life is the conversion and storing of carbo-

hydrate material (*glucose*). The blood brings glucose to the liver—it is the function of the liver to use what is immediately needed and store the remainder. Glucose (*dextrose, or grape-sugar*) is a monosaccharose and is the energy-fuel of the body. Any type of sugar and all starches are chemically changed to glucose during digestion; no muscle can move without fuel and the fuel is glucose! This readily available energy-material has one detriment: Due to its availability glucose cannot be stored as such—this material anywhere in the system is immediately appropriated and consumed by contiguous structures. As a consequence, glucose must be altered in a manner that availability is not sacrificed and yet that it be protected from indiscriminate and *ad libitum* use by any tissue. This is the function of the liver—assisted by the pancreas. Hepatic action converts highly active glucose into relatively inert glycogen; conversion is performed only on the glucose that is over and above the immediate needs of the host organism. Immediately needed glucose is thrown into the blood-stream and is transported to the muscles for their use—the remainder is converted into glycogen and stored. When there is a demand for large amounts of glucose (*physical danger, drop in temperature*) the liver reconverts the stored glycogen to glucose and dumps it into the blood. In certain disease conditions the glucose/glycogen conversion is over-efficiently performed (*this seems to be a factor in non-neural muscular atrophy*), in other cases (*hepatic diabetes*) the conversion occurs only slightly. The amount of sugar (*glucose*) found circulating in the blood depends upon the conversion function of the liver; blood-sugar concentration is rigidly controlled.

The secretory function of the liver, no doubt, is the best known—nearly all are aware the liver manufactures bile. And what an important material is named by those four letters!

Bile is a highly complex, viscous liquid that is fashioned by, and secreted from, the liver. This important material is elaborated within the liver and is stored in the gall bladder until needed. When fat in any form reaches the small intestine the bile is thrown into the gut. Bile is absolutely necessary for digestion—its major use is that of converting ingested fat into soap so that absorption of the fat can occur. The fat molecule, like that of protein, is too dangerously large to enter the blood-stream directly and requires changing into a more easily assimilable form. Bile causes the conversion: Fats uniting with bile-salts cause the formation of a soap. After absorption is completed the bile-soap is broken down causing the reappearance of the original fat and bile-salts! The fat (*now in its pristine form*) is transported to already-present adipose tissue and stored—the bile-salts via the blood-stream reach the liver and are filtered out and re-used.

Though the common remark is "Man and his liver" perhaps the truth is "The liver and its man."

THE END

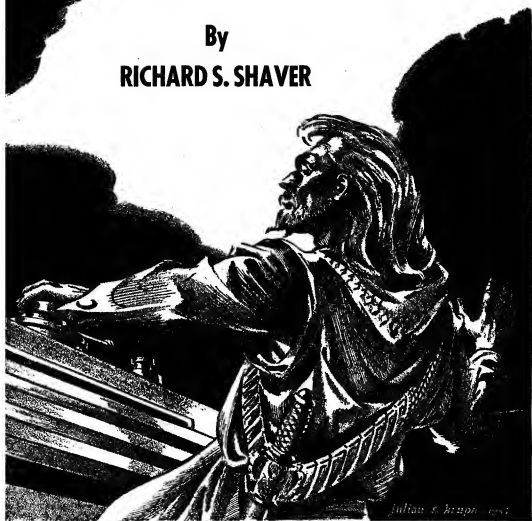


Driving toward her was a menacing shape in a cloud of bubbles

MER-WITCH OF ETHER "18"

Far out in the ether was a sea-world of blue—and in it a lovely mermaid swam. She knew things that cannot be known by mere humans . . .

By
RICHARD S. SHAVER



NYDIA and I suspected the machine was designed to give sight into the endless oceans of life that are called *Etherea*—that permeate all space and all places.

As Troe swam out of the blue murk and hung there looking out at us, Nydia wrinkled her small nose at me and squeezed my arm in mock fright. For Troe was a formidable looking spinnny-finned merman.

I flipped the little lever at the side of the ancient mech, throwing it into a higher magnification. Now both the visual and mental impulses from the cubical screen (of twenty feet to a side) overwhelmed our consciousness of self with a vastly vivid awareness of the life within the focus of force that is the great screen. Abruptly Nydia and I ceased to exist, became as selfless a part of the scene as the blue, gold-flecked fluid through which Troe's powerful finned limbs drove his broad-backed bulk.

Troe was, as a young male is apt to be, thinking of a woman. The woman was his step-mother. His aged father had married her two years before. Troe's father was ruler of all this rich land of Torvan.

The ceremony had brought an end to Troe's long expected succession to his father's seat of power. Troe had no longer any claim upon the riches of Black-spire or the wide sea-bottoms of Torvan.

Shortly after the ceremony, Troe's aged father had died. Lar, the alien woman, now his step-mother, was no older in years than himself.

Troe flexed his powerful webbed drivers in displeasure; he did not like to think of his father's death. Primarily he did not like to think of it because he had found himself dependent upon a young woman's

will. It did not sit well to become so suddenly a mere vassal in his own ancestral home.

Lar was a woman strange to all the Torvani, of a nature incomprehensible.

Troe shot along over the bright pebbled bottom of the sea of blue fluid. Carefully he avoided the great grey star-fish that reached suckered, man-length arms for his blood. Impatiently he flicked aside the purple flowers of the passionweed. Skilfully he circled the netted tangles of blood-thorn that reared formidable barbed curtains of vine in his path.

Troe had an inner conviction that Lar, his step-mother, had flim-flammed himself and his brothers out of their rights. That she had married the old man purposely to accomplish the deed. That she had hastened the senile old ruler's death by subtle means, by her alien arts.

He suspected that now she was casting about for the most suitable consort to allay her loneliness among the alien, nigh unfriendly people whom she ruled.

When her yellow eyes had selected this man and married him, Troe knew he would have to leave.

That day he would call his friends together, lash their belongings to the backs of their dolphins, and seek a new home. That would mean a dangerous trip through wild and unknown sea areas beyond the borders. But Troe could not live in Torvan then!

But these thoughts of the alien woman who now held what was rightfully his were subsidiary. For Troe desired her for himself with all the fervor of the first love of youth—and despised himself for that desire.

*For those who have not read the "Nydia" stories in *Amazing Stories*, I introduce Nydia—the blind feet-girl of the caverns in the depths of mother Earth. She is the mistress of an ancient art: that of producing miracles by her mastery of the use of the Elder race's scientific mechanisms, which exist nowhere on earth but in the deep caverns where the Elder race made their home before Earth had a sun. She does not, perhaps, always understand the science behind the actions of these machines.

Myself, the author, am a man whom she rescued from prison and took into her secret way of life deep within the earth.

Nydia and myself, among other fascinating studies, had often sought to understand the use

and purpose of an ancient machine which had a label in the Elder writing which seemed to translate "INSEEMECH." Finally we got it into operation, but for our long hours of application, got nothing from the screen but views of peculiar and alien jungles, sub-sea vistas of strange life, or of wild desert mountains, or again of airy worlds of flame and cloud and mist. But of what all this really meant or where it was that we were looking at, we could learn not a thing.

Many worlds the machine seemed to give the eye an entrance to; but in none of them did we find life immediately, until, with the dials set at "18" (which I called Ether 18 for want of a better name) we saw Troe—a swimming, finned man.—R.S.S.

MY SWEATING hand slipped on the dial which caused the beam to follow Troe through the gold-shot blue immensity. I lost him, and sought him frantically through that vast place that is "18" on the master dial. (The dial controls the machine that is able to see other worlds of life that are perhaps ether, or perhaps many things far different from the ether concept.)

I call the swimmers in the blue, gold-lit immensity mermen, but they are far from our ordinary idea of a mermen. They are a four-limbed swimming man-like animal. They are not "men."

All those hundred numbers on that dial give each a view of a separate alien world. What in truth, or where in truth those worlds are, I do not know, except that they are adjacent worlds.

Their time is erratic, different from our own, in world "18". Sometimes activity speeds up strangely, compared to our own rate of motion, then again, suddenly or slowly, erratically, the whole world freezes, stops, is cast into a state of stasis where nothing moves, no change occurs. These static seizures occur sometimes locally, over small areas, and sometimes over large areas of that world.

The swimmers are conscious of this change as we are of night and day. It is a mysterious life in many ways. The stasis seizures are not cyclical, seem unpredictable.

I found Troe again because he had swam into such an area of temporary immobility. Troe hung motionless before the door of a vast and ancient palace of black stone. A time defying natural fortress that had sat there in that timeless blue ocean since. . . .

I had leisure to search the whole place for Lar, the alien step-mother whom Troe desired, suspected, and in some measure feared.

* * *

SHE, Lar of Peristan, the forbidden city—queen now of this barbarian city of the Torvani, called Blackspire—stood within the great hall of the black pinnacled natural stronghold. It was a vast chamber hewn out of the natural rock.

In front of her hung a sphere of the same golden stuff of light that danced in little flecks through all the blue fluid that was their air and in which they swam.

I had not seen the golden flecks gathered together in quantity before, and I realized that it might have potent properties, by the intensity of her gaze upon and into the glittering sphere's surface. The whole globe, the only moving thing in all the field of stasis, moved and rolled in cloudy iridescence in upon itself like many smoky snakes in a net—or like strange life in some weird, misty-bodied function of fecundity.

She was as tall as Troe. Her flesh was not the blue-veined marble that was Troe's people, but a green and gleaming sculpture with smoky yellow highlights and golden veinings.

Her breasts were high and proud and purple nipples, her chin was a strong round under her wide sensuous mouth. Her eyes were deep golden mysteries under her coiled purple hair. Her long finned arms and fragile webbed fingers were extending toward the writhing globe of yellow magic where it hung in invisible chains of magnetic force before her.

Whether those arms were extended in supplication, in invocation, or to sense with her fingers some mysterious message from the globe of living fire, I could not say. Perhaps all these things were true.

About her floated the whole court of this palace that she now ruled.

Many strong warriors floated there in the frozen, unthinking waiting of the stasis that was to them as night—a time of rest. Fitted with jeweled breastplates, hung with short broad-bladed swords upon their hips, these warriors looked capable—veterans of more than one campaign.

Two of them I recognized as brothers of Troe. Some of them were armed with tridents, the balled nets that hang at the waist from the belt in readiness, as well as the short broad blades—but these weapons now were for the most part hung in racks upon the walls. The alien queen was armed only with a long-handled cylinder of the same golden glitter inside its transparent round as the floating ball before her.

The whole immobile courtroom was a scene of weird splendor. The expressions of awe and fear and hidden, curbed anger on the warriors' faces; the envious guarded faces of the females, told me that this usurping queen was feared and obeyed. But not greatly loved. It told me, too, that she was little understood by these people of the Torvan bottoms. And all of them

stood in a frozen "here" and a fixed "now" that is the peculiar motionless lack of change of the stasis of world "18."

SLOWLY the binding magnetic of the peculiar stasis relaxed. The accepted, unpredictable phenomena of their life departed, once again their fins began to fan the blue fluid.

Movement and change came more and more swiftly into the great vaulted chamber of black rock. Again their bodies surged with the slow current of the blue fluid. Again the golden motes that was their light source began their ever-dance.

The long green arms of Queen Lar trembled with an intensity of mysterious effort. Her long, full lips moved now, her sharp teeth glittered behind the half-smile of sensuous joy in the consciousness of power that was her expression.

Swift, into the great vaulted hall, hewn long ago from the black solidity of the spired rocks, swam now Troe. As his eyes found the queen, he swam swiftly toward her, and behind her the little blue face of a maid of his own blue race showed in pained disappointment that Troe's eyes had not found her face first instead of the Queen's.

"Greetings, mother, I have news!"

"Let it keep, my step-son. Can you not see I seek a vision from the ball? We must know what the Tlarg leaders plan."

"An' you heard me out, you would not need your flummery magical ball. I come from our outpost along the southern lower borders. I bring news of the Tlarg. Think you I have been a-fishing?"

The tall green female took her gaze from the ball of strange golden force, let her long arms sink. Her eyes turned their yellow mysterious depths upon Troe's hot, red gaze. Troe looked into her own eyes as dominatingly as though she were not the ruler, but herself; as in many ways, he was. Lar's thoughts were that truly there would be fire between herself and this man, of one kind or another.

"Speak on, Troe. For your father's sake, I listen."

"A strong force at the Tlarg are maneuvering upon the lower border. And over-head, in stasis now, another force is frozen; waiting to descend upon us!"

A swift murmur ran through the blue fluid in the great ball. A murmur of vibrat-

ing fins, of tridents grasped from the walls, of questioning lips saying:

"War has come then?"

"They attack from overhead and from the lower border? We must move at once!" The queen was frowning. This warring was not familiar ground to her; she wanted none of it.

"Not so, my mother. These are but feints. Their attack will come out of the great cold spot. They will use that place where they can go and we cannot follow. Their gear and supplies, their main forces, must even now be nearing our border where it edges the cold spot. We cannot go into it. With their thick skins, they can survive a long period within the cold. We must prepare for their main attack from that point. If we are drawn aside by these feinting forces, we will be taken from the flank, Blackspire caught unprepared; that is their tactic."

THE queen pondered a moment. Then she turned again to the golden ball, and now there seemed less difficulty in her control of the strange golden ball of coiling force.

Within the ball's murky heart a scene, far off, a scene of vast activity and many shops, formed.

The swimming ranks of the Tlarg, the heavy long tubes of supplies borne on the backs of hundreds of swimming, muscular Tlarg warriors, or towed by the vast, swift paddling worms. Too, in the foreground reared the huge heads of the fighting, trained gar-worms, running on the bottom.

The long tiers of the gar-worms legs were like the oars of fearful galleys—their awful heads the living figureheads. Dragonships, in truth, the fighting worms of the Tlarg.

The Tlarg warriors were a hellish crew to face, the backs and limbs with sharp spines, gave a kind of horned toad appearance to their thick-skinned, warty bodies.

The whole huge river of war gear and fighting Tlarg warriors moved slowly, as through an invisible molasses. This was the effect of the fierce cold of the dreaded cold spot, an area where no life could exist but through which the Tlargs could move protected by their thick hides and beast-like strength.

The dread this scene aroused was re-

flected on the faces of Troe's friends; the Tlrg were mean fighters. Troe knew they chosen this time for their attack because of Lar. Because of this alien step-mother succeeding to the throne, they must fight these brawny, numerous, bloodthirsty Tlrg. The knowledge did not help to make her more acceptable.

Some spy of course had told the Tlrg of the dislike and dissension her sudden accession to power had caused among the Torvani, the sons of the Great Finned God of the Deeps.

They must have learned, too, that Lar's capabilities did not include the art of war; that the three sons of the dead ruler would be hampered in their defense by her arbitrary will, her inexperience, her ineptness, her distrust of their loyalty.

These things, too, were in the face of Lar as she studied the picture of the enemy within the mysterious golden ball, glancing at Troe's excited eyes, fiery red as he estimated the strength of the Tlrg.

Of the fighting worms, their most terrible weapon, there were some three hundred, and Troe's eyes paled as he estimated the chance of survival. Troe saw little to be pleased about in his swift mental computation. They might beat back the fierce Tlrg forces, but they would not enjoy the victory, for most of them would be dead.

Now Lar, her green flesh rippled over with the flaming yellow force which she alone seemed to understand, said:

"Troe, bring me that Tlrg spy from the dungeon and we will show these blundering beasts that we do not like their ways."

Troe, who had seen somewhat of her lesser magical work, did not question, though he was irked by her commanding tone. He did not know she had been a near-queen in her own land. He admired the flaming yellow life in her eyes, admired the heaving, high breasts and wanted once to taste those long sensuous lips. Troe hastened off upon the errand.

His brothers, leaning now against the great sculptured black pillar behind the pulsing yellow globe of with fire, exchanged exasperated glances. For they both looked to the older Troe to protect their interests against this interloper who had so neatly appropriated their heritage—as they saw it.

To the minds of the two young brothers of Troe, Lar had made them all, the whole proud court, but lackeys of her whims.

Most of all it irked the two brothers that Troe truckled, did her bidding too willingly. Tonor and Tuhy*, both out of the same mother by Troe's father—did not like the change in rule.

* * *

EVEN as I watched the weird court room of the Torvani, admired the soft play of subtle light on their undulant webbed limbs as they balanced on the gentle currents of blue and fluid force, responded to the fiery life of their red and beautiful eyes—a stasis froze the whole place, remained while I could have counted ten, and went as swiftly as it had come.

* * *

TROE swam back through the undulant beauty of the sinuous limbed Torvan courtiers, towing the bound form of a spiny, toad-fish Tlrg behind him.

Now Lar said a few sharp words to the Tlrg, but he shook his head. She turned to the golden ball and with a quick darting motion of the hands reached into it, pulling one of the larger and more glitteringly armored Tlrgs, who were pictured within the ball, toward her.

Now on the pulsing ball of witch-fire was the frightened face of the officer, and Lar spoke to him in cold, frightening ferocity.

"You can see that Lar, the queen of the Torvani, whom you attack, has the power to bring you into her presence even at this great distance. I could kill you, too, toad-fish, and your army as well, but I wish to warn you instead, being merciful. Look!"

Lar lifted the long-handled golden cylinder from the belt about her supple hips, pointed it at the now cowering Tlrg whose chain was held by Troe. Her teeth glis-

* Tonor and Tuhy are separated by some few inches in height from Troe, the older. Time, here is reckoned by dergs; the difference in height indicating the past time between their births. They grow at a nearly uniform rate all their lives, and the derg, unit of height, is often used to indicate difference in age. Tuhy is three dergs younger than Troe, and Tonor two dergs younger than Tuhy.

They do not think of time a great deal; it is always "now" there. When they are old, it is because the "change" has set in. The change is known to be chemical.

They have no sun, no cyclical phenomenon or regularity.—R.S.S.

tened once a swift gloating smile as she squeezed the yellow handle.

From the snout of the cylinder shot a cloud of the darting yellow motes straight into the startled face of the captive!

"Watch him die, toad of a Tlarg. And tell your warriors what they face when they reach the Torvan borders, coming out of the cold spot. When they set foot on Torvan bottom—they die!"

The cloud of dancing fire motes burned into the now screaming face of the Tlarg spy. His eyes blackened swiftly, the flesh began to fall away in a grey powder, the bones stood out bare. The Tlarg was a terrible death's-head of agony before he fell to the black stones of the floor. He lay writhing and screaming for long moments—those watery, gurgling screams of death.

The Tlarg officer, staring out of the ball, writhed too with fear and moaned as he realized the horror the army faced.

Lar drew her long, green finny hand out of the golden ball, and as she released her mental hold upon the Tlarg, the man's face receded. He became again a small part of the vast pictured scene of the Tlarg army in terrifying progress across the dead waste of the barren bottoms of the Great Cold Spot.

Intently Lar's deep, yellow eyes, and Troe's red-flame eye swatched what this sudden horror might do to the morale of that army.

The officer called about him the other Tlarg leaders. These leaders were the larger, for they were those whom "change" had most benefited and were therefore most fitted to command. (They were men selected by the common vote of the warriors; the fiercest, most cunning; but the ruler of the Tlarg was one whose seat of power was inherited.)

Lar and Troe watched the fear stricken officer telling the others of what he had seen through the magic of the Torvan queen—of what her alien, mysterious magic had done to the captive.

The fierce, stubborn metal of these hated Tlarg was borne home to Lar as she watched the officers decide to keep the occurrence to themselves; that the performance must be in the nature of a bluff to frighten them from their purpose.

The vast flow of the slow-moving might of the army went steadily on, nearer and

nearer to the warmer bottoms that were the fishing lands of the Torvan.

Troe looked into the mystery that was the eyes of Lar, saying:

"If you can kill at a distance through that ball of fire you had better do it! For as the Norns Fates weave and clip, sure their shears are feeling now for the thread that is the life of the Torvan race."

"First I would counsel with you, my Troe—and then with the generals. Meanwhile, give the orders for mobilization, and then swift to my side. I will be at the palace of the green fire. I have work to do."

* * *

NOW, outside, the slender girl riders of Torvan dolphin-messengers fling their limbs along the sleek sides of the mounts and flee into the blue depths in all directions. For the branch was burning, must be borne flaming for war to each great barracks in all the Torvan bottom lands. In each girl's hand smoked and blazed fitfully a branch of the white oil-coral, the red bale-fire that is the war-sign; the calling of the clans.

Inside his father's palace, Troe swam slowly up the long ramp. Ahead lay the Palace of Green Fire, which was a great chamber in the black rock-spire Lar had taken for her own two years ago. She had filled it with all her alien belongings—and many were the whispered tales of her forbidden incantations and dark doings in the fearful place. There the green and fearfully strange flames of her witch-fires leaped always in the wall braziers. There, too, many a spy sent by those who feared her alien magic, had entered—but had never been seen again, alive or dead.

Troe entered, butting the wide valve of the double oval door open with his shoulder. He drove swiftly into the center of the chamber with one flip of his drivers—to conquer thus by action his fear of the place. He heard the soft laugh of Lar waiting by the great round blackness of the center pillar, smiling at his obvious aversion for the place. Her long green body was clad now only in those flickering golden veils of subtly woven threads of seeming fire which she alone possessed. She was now again the mysterious and beautiful witch-woman whose form would not leave Troe's mind.

Troe's heart drummed harder under the

taut muscles of his breast. His red eyes burned in the green-lit gloom. His long webbed hands reached out against his will to touch those sleek green-glowing shoulders, to grasp her, own her, to break the barriers of hate and distrust and suspicion.

But she turned her eyes to his and he saw a desperation and fearful hesitancy there that revolted his action-minded, fearless inner self.

Those long sensous lips that moved forever in his heated mind, moved now so close to his eyes, saying:

"My Troe, if only I could trust you and the other Torvan lords and officers. If only I was not an alien, knowing friend from foe. There are things I must tell you all, things I must teach some of you and I cannot!"

The realization that this alien woman had held secret from them many powers, many weapons, the secrets of her alien lore, struck Troe suddenly. He realized that Lar feared them all and held these secrets to herself as her only safeguard against them. Somehow that Lar should have such fear was not good to hear.

Her voice went on.

"I cannot tell you what I must tell you. I cannot arm you all as I must arm you, cannot teach you my arts now; there is so little time. And you all hate me; would kill me if you knew how. So long as you all hate me I cannot give you my powers, my weapons. If I do not you must all die while I save myself. Troe, you must swear to be my friend, to work for my interest only, then I can trust. . . .

"Troe, you must marry me to save your people. Either that, or I will go now, go as I came, an unwanted hated outlander; and curse the day I found this seeming haven."

Troe was astounded by the meaning in her flow of words. That the seemingly capable and always resourceful Lar should have had this fear and doubt of them all and of her safety here was news to him. That she would marry him; he had not known that. And she thought him reluctant—was persuading him! Well, of course she was hated, especially by the women, but they feared her far more.

Her impassioned voice went on.

"If you marry me, Troe, it will resolve all the barracks between myself and your

people. You are the rightful heir in their minds; marrying me will seem to but right to them. What I do will seem your doing then, will not turn against me when they find my powers in their hands."

Troe stretched his long arms out and grasped the green smooth shoulders, slid his hands down the soft round taper of her back, and his eyes burned like two dark coals in the green light from the witch-fires above. Even as his mind found the words to tell her of his longing for her. . . .

Stasis spread numbingly through all the wierd palace of Blackspire—froze them in their half-embrace. Those swelling, impassioned breasts touching, those lips half-lit with the fires of love burning nearer to each other, were frozen into strange waiting for fulfillment.

* * *

OUT of the barren bottoms of the Great Cold Spot groped the stiffened, slow limbs of the Tlargo armies, and the terrible writhing strength of the fighting worms.

Faster they moved as the warmer currents of blue fluid took the frozen chill from their limbs. The fierce mouths of the fighting worms gaped open, long tongues lolling redly as they sucked up the warmer fluids, shot it backward through their gills. On their backs the half-frozen Tlargs, in rows of a hundred to each side of the worms, banged their shields with their tridents and shouted a war-song to get the blood flowing in their chilled veins again. They were all cheerful now, and ready for the coming fight—for were not the Torvani far toward the lower borders chasing the fleeing decoys with which the trap had been baited?

Only the officers, trailing the scouting dolphins out ahead, were sober faced. They feared what would happen now from two sources. Their own men would turn on them for not telling them what they faced when Lar began to kill with the burning yellow death. Or kill them for being so inept as not to know of and be prepared for her strange weapon. But, then, the Outlander Queen of the Torvani would not let them live long enough to reap the vengeance of their followers.

They could not know that the unpredictable stasis had seized the whole inner lands of the Torvani, that the Norms had set the threads of life running their Tlargo colors through the life-pattern.

I SWUNG the beam of the Inseemuch far across the lower borders of Torvan, down into the pressing gulfs where no Tlarg or Torvan dared swim. There mighty monsters prowled and fought, there lay vast areas of permanent stasis with strange and horrifying life forms frozen into motionless floating forever.

There, too, beyond those gulfs and deeper far than the Torvan lands, lay the holdings of those green-skinned, long-finned people whence Lar had fled two dergs before.

A mysterious, indolent people, they drifted through the tall-towered vastnesses of their city of Peristan. Dreaming, they drifted, gazing into their golden balls of strange force and watching their dreams grow and spread within the infinite micro-fields within the balls and become weird, fascinating worlds of life.

Or they loved along the purple-vined streets and byways, arms intertwined, drifting on the quiet twilight fluids of the deep that surround and protect Peristan.

Within one of the great, towered mansions where the windows are the doors and are all open to the swimmer, were gathered three sisters of Lar, her father, her former lover and two of her long-limbed brothers.

They were gazing into one of the great fixed balls of yellow force. Within the ball was pictured the black-spired palace of the Torvan race.

Nothing moved within the many-peopled pile pictured there.

And now the focus shifted under the sister's querying mind, to the chamber of green fire where Lar, her arms half-encircling Troe, lifted her lovely, too-wise face for his first kiss. Stasis held the scene in its strange spell, no current of the blue fluid stirred the slightest hanging fringe of the sea-dragon drapes. Not a muscle moved in that poised pair of strong and vital bodies.

A great oath broke from the lips of the tall green warrior who had been betrothed to Lar not long ago, before she fled the ruler's wrath for her forbidden sorceries. An oath as great as that he had sworn when he had heard of her marriage to the barbarian, the senile ruler of Torvan.

The three sisters of Lar looked at each other's faces knowingly and as they turned again to the screen in the ball a cry broke from them, for the great fighting worms of the Tlarg had reached the near edge of

the stasis field. The momentum of their vast bodies plunged them into the stillness. Floating, legs outspread, they hung like great-oared undersea boats of some weird design, heavy on their backs the now frozen and still bodies of the fierce, toad-fish Tlarg.

"When that stasis field dies, the Torvani and our Lar will both die. They are not ready . . ."

The green long-finned warrior, one Tonarl, of the Black Shield, had summed up the thing in swift words, his trained warrior eyes saw that the Torvan stronghold was doomed. Delayed by the stasis, they had missed the opportunity to ready themselves for the army that now floated in the involuntary sleep, or circled the rim of the stasis field in watchful readiness to attack the instant the unpredictable tides of force relaxed their hold on the stronghold.

The fat old father of the women spoke:

"The only hope of these Torvani lies in us. Our weapons could lay this fierce band of barbarians low, did we choose to extend ourselves so far, and had we time to arrive before their fate is sealed. I for one, still love my daughter Lar, though I do not approve of her flight, of her casting her lot with an alien, barbaric people. Let us prepare, the stasis may hold them inviolate until we arrive. It is a long way."

Lar's sister broke in, the taller of the three, her lean, strong, wide-mouthed face eager, the purple hair fairly crackling with the yellow force that pulsed in her green translucent body with an underflow of strength.

Lar has become the ruler of this race of the Torvani people with the death of her husband. It may have been her plan to weld these people to the Lanvi. In truth, since Lar is still legally a subject of our Makro (king) the whole race of Torvan are our vassals—or our allies. It is our duty to aid them. It am going to the Makro and demand an audience. This is no matter for ourselves alone."

The burly father turned slowly, balancing thoughtfully in the fitful current. His long, wiry, pronged fins were soft blurs of vibrant power in leash. He was still a powerful, unaged Lanvi.

"And Lar were not about to die, I would not advise telling our ruler anything. But as you say, her life and that of her sub-

jects now depends entirely on our speed."

The tall sister did not wait his thoughtful words, but flashed off in a swirl of golden bubbles and sharp blue spurts of fluid from her humming fins. Her long driving limbs flashed once thus and she was gone through the high wall opening into the golden streets, off through the tall towers, a trail of golden, swirling little bubbles marking her wake.

* * *

I SWUNG the ancient Inseemuch Ray back across the endless leagues of blue and gold and grey-green sea-jungle. Across the vast dark deeps, across swarming, terrible, savage life of the alien sea-world, if it is a world.

Now again the great black stronghold of the Torvani, held still in the weird, timeless grip of the stasis.

* * *

A LONG the outer edge of the stasis band were imprisoned a good two-hundred of the floating sea worms like vast flies caught in molasses, or like weird reflections of their fellows caught by some vast mirror of force and held so forever—or until the Norns awoke.

Along the vast invisible barrier where the van of the Tlargo army hung, warred now the vast, waiting column with attacking bands of Torvan dolphin riders who had not been caught in the stasisband.

The riding, swift messenger girls must have reached some objectives outside the sudden grip of the stasis, brought back some forces of the outer clans.

These must have followed the outer rim of the stasis flow of force and come upon the column of Tlargo from both sides.

They had not waited but on their swift dolphins swooped at once to attack.

Some half-dozen of these bands of dolphin riders dived in long arcs down upon the column of huge war-screaming worms. Down upon the great lumbering tubes of war gear, down upon the slow-swimming ranks of lighter-armed Tlargo, the "fin" soldiers.

The cavalry of the Tlargo, dolphin-mounted, spear-carrying, swift-swimming, were for the most part rushed headlong into the stasis field by their scouting, out-rider duties.

The rear guard of dolphin cavalry were coming up swiftly from the rims of the cold spot, but had not yet arrived to re-

pulse the sudden attack of the raiding Torvani.

Meanwhile, hindered by none of the mounted forces of the Tlargo, the Torvan dolphin-cavalry were making hay. Swooping long arcs of spear-thrust swiftness down upon the lumbering warrior and armor-laden fighting worms, down upon the slow-swimming light-armed warriors of the rank and file, they thrust home their charge till the great worms swung their vast heads about, jaws gaping to engulf them. Then up and away into the gold-spangled blue fluid.

Swiftly the whole blue field about the stasis became flowered with death, streaked with the long red streamers of the blood of the Tlargo. Here and there floated a dead Tlargo, his throat cut and gaping or his chest pierced with the long lances of the riders. There a vast body of fighting worm thrashed in its death throes, mangling the Tlargo with its gigantic flung coils, its terrible weight overturning the baggage sledges, crushing the long tubes of war gear, hauling crippled, screaming Tlargo writhing through the blue fluid.

Now from the rear flashed the long pennoned spears of the rear guard dolphin cavalry, far outnumbering the Torvan dolphins. Like fleeing devils, the Torvani screamed white-teethed taunts over their shoulders as they arrowed up, up, and away into the now cloudy murk about the battlefield.

* * *

AS SUDDENLY as it had come, the stasis dissolved before the harried, partly disorganized army.

The terrible, inexorable advance began again. The long red-mawed heads of the worms swayed left and right as their drivers sought to space them safely, their long oar-paddled legs began again to plod, their flat bodies to half-glide, half-swim ahead over the slippery mud. Again the Tlargo took up their monotonous war-chant.

*"Blood, blood, of the foe;
Blade, blade, fleshed in the foe;
Scream of the coward.
Roar of brave gar-worm;
On the bold Tlargo!
To death or to power;
On the bold Tlargo!"*

They sang this to the beat of their short, broad swords upon the flat, oval shields; a fierce clang-clanging, rhythmic and

martial.

Above the clangor shrilled the harsh, high piping of long, yellow reed flutes, played by the Tlargo equivalent of the "vivandieres" riding to war on the baggage carts, anxious to be in on the looting to come. These horny finned female Tlargo were not much to look at, their fierce teeth glittering, their wide ears spread to catch the meaning in the tumult. Their wide, flattened limbs, made for swimming in the pressuring depths of the lower bottoms, were muscular, terrible, a far cry from beauty. The Tlargo were a martial, fierce, fish-like race far different from the beautiful, round-limbed, more delicate-finned Torvan and Lanvi races.

* * *

IN THE palace of the alien queen of the Torvani, Lar had pressed her lips to Troe's, half-unconscious of the long lapse and fearful pressing change of position of the Tlargo outside during the stasis. Avidly Troe returned the kiss, running his webbed hands up the smooth forepart of her long green arms, touching the coiled purple tresses, gazing deep into the smouldering, passionate yellow eyes, murmuring:

"Lar, my smooth swimming, beautiful stranger, your lure has been burning in my mind, strangling my heart, since my father brought you home, wounded, that day. We all nursed you, admired you, were afraid of you. We were all somehow ashamed when your gratitude made you accept our foolish old father's advances. If only one of us had spoken—but it was my right to speak first among us brothers, and I feared you, was unable to face your eyes.

"Now the past mistake can find a remedy. My arms, my sword will protect you from your enemies among us. Tell me, how can we ward off these Tlargo before it is too late. Their numbers are vast, they fight like blood-fish, like barracuda. Many of our people must die."

Now, from outside, the approaching tumult of the columns of Tlargo beat at last through their enrapt senses, made them aware of the too-swift approaching doom.

Troe spun, a vortice of blue fluid leaping about his spinning body, looked down upon a vast half-moon of Tlargo slow-nearing the tall spires of Blackspire castle.

Troe's electrified mind shrieked inwardly:

"How came they here? The stasis has

held us unaware while they approached! And we are unprepared, caught now like fish in a net. The damned stasis . . ."

Troe darted in surging bursts of power through his diving fins, golden little bubbles bursting in shining clouds about his wake, down to the great lower halls of the castle. The warriors were busy swinging shut the great barred gratings of the main entries against the approaching Tlargo. Troe's heavy shoulders and hard-driving limbs thrust too against the swinging, creaking weight of the barriers.

"The seige is on, nothing is ready—not even food stored ahead."

* * *

TROE stood, looking out through the gratings upon the Tlargo. Blue, muscular, finned limbs boating rhythmically, row on row, thrashing the hard, bright blue of the fluid into a maelstrom of bursting gold-lit bubbles and swirling, glittering, blue vortices.

The terrible gar-worms, vast, gate-mouthed, heads rearing, goggle-eyes peering in fear or anger, roaring great roars of blood rage, their long red tongues writhing like great red dripping snakes, their long whip-ended tails coiling and uncoiling . . .

The darting dolphins wheeling in perfect formations, arrow swift, their spears dripping, now dipping to the breast of a Tlargo and rising again fresh-blooded, now pennoned with the long streamers of gore in the blue . . .

The charge over, their swift flight-spiral upward and out of range of danger, only to reform and swoop again upon the fierce, stubbornly fighting and obviously winning Tlargo . . .

Troe's heart contracted in pity at the fewness and the gallantry of the Torvan cavalry seeking to delay the advance long enough to give the Torvani time.

Now against the gates of Blackspire thundered the rams of the Tlargo. Great metal-tipped spars borne between two the gigantic gar-worms flung a terrible mass of sharp-pointed crushing weight upon the black, old metal barriers. But the ancient work held the first impact.

Into the many openings, now but lately barred against the swimmers, came the red-smouldering fire arrows. The metal cross-bow bolts each bore a bit of the flaming oil-coral that burns with a hateful stubbornness. Too venom-tipped darts struck

through the opening, between the bars in showers like rain. Then a great worm would wrench at the barriers with his vast claw-tipped, horribly-flattened and hand-like claws, eager red eyes blazing to get at the meat of the Torvani inside.

The heavy armor—the riders on the backs of the worms, which correspond in manpower and usage more to the ancient war-galley than anything else. Swimming above these the light-armed main body of the Tlalg, armed with crossbows and short swords, and every fifth one of them bearing a great shield and twenty-foot spear, ready upon attack to form a rampart by closing together, a rampart of metal and points impervious to the charge of the Torvani.

A third tier of force hovered high above this main swimming body of troops, the cavalry of the Tlalg. Long spears with floating pennons, a small round shield, a scimitar-like weapon at their belt for close-in fighting. On shield and pennon, the great painted gar-worm head of the Tlalg.

Higher still above these wheeled a dozen troops, near a hundred to a troop, of the Torvan dolphin riders, those who had failed to reach the castle before the stasis. Wheeled . . . and swooped upon the second tier whenever an opening presented, to dart away again when the slower, heavier, less adept cavalry of the Tlalg bore down.

Beyond the vast arc of the encircling movement of the Tlalg forces were perhaps a quarter their number of Torvan troops. Their numbers slowly augmented as the border garrisons returned, as the farthest hamlets of the Torvan bottoms sent their quota to the call of the burning branch. This force waited, in disciplined ranks, waited the chance to use their smaller strength to some advantage when opportunity presented.

The pitifully few bolts, spears, short javelins and crossbow bolts from the windows of Blackspire told them that Blackspire was not fully garrisoned.

The Tlalg leader ignored this growing force of Torvani to spend his main strength and first eager fighting fury of his men upon the black gates, upon the great gold-barred openings of the rock castle, upon covering the efforts of the worm drivers to ram open the great but old metal gates.

* * *

IN THE chamber of the green fires, Lar labored mightily, her blue Torvan

maidens flitting on swift fins at her orders. She was brewing a mighty sending of destructive magic from her Lanvian wisdom, concocting a doom to fit the terrible horde of death hammering at the gates of her castle below.

On the floor Lar traced the pentagram; and reading from a huge metal-bound book, she poured ingredients into the alembic. The distilled green fluid she held at last in her two hands, and standing within the pentagram held it aloft, her face rapt, her body rigid.

About the pentagram flickered now huge transparent forms of vibrant force, and within the chamber was the terrible sensing of unseen presence, of mighty alien thinking.

As Lar finished her incantation, she stumbled over the last weird syllables. The room grew dark, and lightnings flashed through the blue fluid, the awful black bolts of the ether-force crashing into the chamber, shaking the walls so that the mortar cracked.

But Lar recovered, her face near-white with strain. Now about the green fluid, as she intoned the last words of power—gathered a horde of misty wraith-like forms which poured unceasingly into the bowl. The fluid boiled and bubbled with a weird life, rose higher, higher—and now from the bowl and above her hands floated the green fluid—taking a globe-like form.

Spinning slowly it rose, shimmering, beautiful with a deadly, threatening beauty, as a snake is beautiful. Ominous it was with a deadly thought of awful power humming from it.

Holding still the bowl beneath the shimmering globe of green, Lar walked to the entry window. Her maids watchfully unbarred the tall shutters. Though a few arrows slashed through, Lar stepped into the opening and cast the globe out from her hands upon the howling horde of Tlalg below.

Swiftly she flung herself back from the opening as a rain of arrowed death struck after her darting form. Back now to her shining globe of golden force, and standing beside it, she soon summoned into being a view of the green globe outside, as it hummed a grim ominous song of death. She spoke:

"O wraiths of the upper spaces, imprisoned now within my verdigris—obey

Varuna!"*

From the humming green within the golden ball many faces seemed to peer at Lar out of the prisoning green venom, and the faces chanted eerily in answer:

"We obey Varuna, and Lar his priestess."

"Destroy the Tlalg, destroy their war-dragons, their beasts and their women and their slaves. Destroy them all, and win again your freedom."

"We hear, oh Lar, and for Varuna we obey."

Now the weird ball of cosmic, temporarily imprisoned entities rose and fell above the warring host of Tlalg in a strange dance. And every time it touched a Tlalg or a great fighting worm, a dolphin or its rider—that thing screamed and fell lifeless.

And from the fallen bodies a green steam arose, to flow toward and mingle with the dancing green ball of death. And in the shimmering, awful force, a new green face appeared among the many within the ball, and the size of the ball increased with each addition.

But the rise and fall of the green globe was not extremely rapid, and the number of the Tlalg was very great . . .

* * *

THE appearance of this new and terrible weapon, this enigmatic destroyer above them, gave the Tlalg pause for a moment, but soon the officers realized that this weapon of Lar's would be destroyed when she was destroyed, and so explaining to their men, the attack was renewed; and with far greater fury, for they all realized that only with the fall of Blackspire would the slaying of the green globe cease.

* * *

UNDER the furious ramming—the great sea-worms swinging between them vast metal-shod spars—the gates of Blackspire began to loosen. Even as the waiting ranks of Torvan gathered themselves for a charge down upon the Tlalg to relieve the castle by diversion, or mayhap even to fight their way in to the aid of those within—even as their force started to dive upon the press before the gates—with a vast groaning crash, the metal hinges of the gates burst inward.

Now only a thin line of Torvan warriors

held the halls of Blackspire from the fury of the Tlalg .

* * *

INTO the gaping maw of the intrusting head of the gar-worm, Troe pushed the long barbed head of a pike, thrusting it home with all the pressure of his lashing driver fins. The worm collapsed, fell with his spar lashed to himself and to his mate, lashing coils in death agony wreaking havoc among the intruding Tlalg, his weight pinning his mate to his side. The two vast bodies formed an effective rampart before the shattered gates.

* * *

OVERHEAD in her tower chamber of green fire, Lar cast out now many little globes of green force spirits, and now instead of one great dancing globe of death, hummed and danced dozens of growing little death bringers, the fierce, elemental spirits within intent upon absorbing all the life force of the Tlalg.

From the now hard-pressed Tlalg came cries of agony and despair, and also cries of desperate fury. For even as the gates of Blackspire crashed in before them, chance seemed to be turning the tide against them.

For down upon their heads flashed the full fury of the gathering Torvan riders from the southern borders, from the northern hill clans; and even from the western deeps came some loyal flat-bodied allies—the Wanar deep-water men.

Spears dipping, dolphins diving, harsh cries echoing "Eat our steel, Tlalg," "Toad-fish Tlalg," down dived the Torvani, rank on rank, like a resistless avalanche of fury. The water about the gates became a red murk, in which no man could see his neighbor, but struck at friend or foe alike. The scimitars of the Tlalg whirled fierce disks of stubborn steel back at the wheeling, charging Torvan riders, but their losses grew, the piles of dead about the great gates were mounds, were hills to climb over.

But the toad-fish were not warriors to turn aside at the face of death; particularly not when victory gaped before them with wide-open, shattered gates. They set upon the defenders with long spears, with a fury of crossbow fire that hailed steadily upon the thin line of armored men across the gap.

As the press forced the line of Torvan nobles back, as the press made at last swimming room possible within the gates, into

* Supreme cosmic deity, also known to the Hindus. Is represented as four-armed, riding a great scaled lizard with a fish's tail.—R.S.S.

the space that lay between the two warring forces that was peopled only with dead and with reaching spear points and humming arrows—into this space leaped the officers of the Tlalg, the best swordsmen, led by Onde, the Younger, the burly son of the old Tlalg ruler, Onde, the Elder.

Now face to face with the defenders, the superior numbers and greater bodily strength of the Tlalg had its way, and their swords ran red. The blue fluid turned a muggy purple. In the great hall of state, backward and backward they drove the desperate Torvani, dying now to defend their throne.

Troe's brother, Tonal, fell, a broad Tlalg blade finding his throat!

Even as Troe, backed against the great golden dragon throne which was his by rights, but Lar's by Fate's blind finger; even as Troe, bleeding from a dozen wounds, still found strength to leap for the throat of Onde, the ruler's ugly son—a great net of woven nettles fell over the heads of Troe himself and Tuhy. The brothers of Blackspire had fallen.

BUT still, upon the horde of Tlalg, ravens still to enter the palace, swooped and dipped the dolphin riders of the outer clans. And still rose the green ball of death-bringing, prisoned spirit force, and still it fell to claim another Tlalg. And still buzzed and hummed the many little green balls Lar had made, not killing yet, but soon, from eating at the death about, big enough to kill.

IN HER chamber of the green fire, Lar had seen all that had happened as her throne fell to the hated, ugly, barbarous Tlalg. Before the doors of the chamber, she and her maidens had piled the furniture that they might delay their fate so long as possible.

Now cowered about the tall, green glory that was Lar her blue, young maidens of the Torvani. Lar's arms were upraised, her face rapt, as she communed with the elemental spirits captured within her venomous green force balls, urging them to greater efforts, swifter slaying; for now the only hope of victory and freedom lay in the still-slaying, still-dancing green witch-fire.

Now battered at the oval valves of the door of the chamber of the Green Fire, a great log, brought up from below by the

Tlalg. Onde, his broad face a mask of rage, urged the wide-backed, ugly Tlalg warriors on, and the great log swung and crashed against the strong, heavy, metal-bound door.

Shattered, the wood splintered, still the hinges held, still the great log crashed against the portal, and still the rapt face of Lar implored Varuna to hasten the death of the Tlalg.

Now at last in crashed the doorway, and in upon the crouching maidens rush the Tlalg, swords out reaching for Lar's throat.

Swiftly Lar's voice lashed at them in their own tongue:

"And you slay Lar, the death of the witch-globes will not cease! And you treat with Lar, and bargain on her terms, the Tlalg may live."

Onde raised a broad, spiny hand, lowered his red-dripping sword. After all, how did they know that the slaying of the green witch-globes would cease with Lar's death? But there was an answer to that! They'd bargain her a bargain!

Under Onde's hurried orders, Lar was trussed up to the round black central pillar of the chamber.

Stood now Lar, her golden, shimmering garments of strange fire torn, near-naked before the savage, angry faces of the Tlalg warriors—and Onde's sneering, vaunting face pressed close to her own. But Lar's answering smile was also full of victory, for she did not doubt that Onde would fail to force her to recall the death of the green fire globes, the taking of the spirits of the Tlalg by the servant entities of Varuna.

Lar screamed shamelessly as the fire bit at her feet, writhed with abandon as the hot wires thrust deep under her long fingernails; but Lar did nothing whatever to stay the slaying of the dancing globes outside the palace walls.

"When I have died, and when all the Tlalg around Blackspire have died, then the globes will enter the great broken gates and search out each remaining toad-fish Tlalg and slay him. Sooner or later you will die, Onde, and all the gold of your loot will not save you, nor all your promising or bargaining, nor all your prayers."

And Lar laughed as the realization that Onde's victory was a victory rewarded only by death, stole over the savage face of Onde.

He was realizing that in truth here Lar held the cards, and not himself.

Onde dropped his anger, dropped his vaunting, for with the knowledge of his defeat was coming the council of caution, and with honey in his words, he spoke now carefully to Lar.

"And if I offer you marriage, to be my queen over both Blackspire and over all the Tlalg bottoms upon the death of my old father—then what would you say, Lar of the Lanvi?"

For answer Lar spat, trying to strike his face but only striking his sleeve with the yellow venom from her mouth.

"You will have to offer me more sure guarantees than your word, my enemy! Your word is well known to be valueless."

STEADILY, surely, the green globes of death were cutting down the horde of the Tlalg, and the spiny-finned warriors were fleeing now right and left. The great worms lay now for the most part motionless carcasses about the entry to Blackspire. And ever the darting dolphin riders of the Torvan swooped upon the fleeing Tlalg. The horde that had come to Blackspire was now by half reduced, and those remaining stricken with a fear and a sureness of death. They stood, those who could think in spite of their fear, and waited for the death they saw no way of escaping.

Onde, his broad, crudely-sculptured face working with rage at the stubborn Lar's defiance of his torture, whirled on his driver fins and darted to the great barred entry of the chamber, looked down from the hollow spire upon the screaming chaos that had overtaken his horde of brave warriors.

"By the blue fins of the Great Dragon, was ever a leader so tricked by fate! I win, and in victory find defeat! Blackspire is mine, and the lands of the Torvani are mine; Lar, the witch queen shrieks under my torment; and still her unnatural work slays my men. Lar, for this day's work you shall know an agony that will not end so long as life can be kept in you. Your spirit will rot forever in the carcass that was you after death does free you from my vengeance—my Tlalg witch-doctor's magic can see to that, at least!"

Old Onde, the real ruler, pushed his bulk toward his strong son, peered out at the

dancing witchfires that consumed their warriors, slew their fighting beasts, danced a dreadful exultation over the battlefield without.

"You will note, my son, those elementals she has prisoned within her venomous force globes do not touch the Torvani. We hold many prisoners. We could make the castle inviolate, impregnable to the spirits of the green fire, if we bound before all the windows the bodies of living Torvani. Eh, son?"

"Hah, sire! That old head is still the leader here among the Tlalg. I bow to you sire—and now to work. I will yet retrieve a victory from this morass of death."

SWIFTLY the Tlalg labored, holding the struggling, cursing Torvan warriors who still lived up against the yellow metal of the barred entries, binding them in place, lashing fast another swift below; till all the entry openings were lashed tightly over with the bound bodies of the captive Torvan warriors.

In the center of the great shattered gateway of Blackspire stood Onde, holding in his arms the bound body of Troe. One slim opening remained yet unclosed, and now swift as darting minnows fleeing from the gar-pike, the Tlalg finned down and into the castle Blackspire—and safety from the green death.

Ever, as one of the dancing, swooping globes of green bale-fire stooped to follow inward the fleeing Tlalg, Onde pressed the body of Troe tightly against the only opening, shutting the way; and the globe, under Lar's command, not killing any Torvan warriors would recoil from the only opening into Blackspire to avoid killing Troe or any other of the living barrier.

Now Troe, seeing that all was lost unless the green fire-globes went on with their soul-stealing, death-dealing, conceived that his own life being lost anyway, he might as well get its worth from the hated Tlalg. And as the green globes clustered ever thicker before the human barrier at the gateway to Blackspire, Troe carried out a subtle plan of his own for Lar's sake.

Outside, the last of the horde of the Tlalg had either darted to safety within the castle or had died under the dancing, swollen globes. And out to the cloud of these swollen, fat, green globes of soul-

venom, Troe sent his thought—and the dancing, hungry entities within listened to him:

"O servants of Varuna, you think that I am one of the Torvani but that is not so. I am one of the Tlarg who happens to look like a Torvan warrior. I am glad you do not slay me as Lar has ordered you, for if you do not, she will never give you freedom from her spell. That way I will have my vengeance upon you for the death of my comrades. Ha, what foolish spirits, ha, ha!"

Still as death, the hovering globes now floated, listening, what they used for thinking glowing deep within the green fire. And whether those savage elemental souls knew what Troe was up to and accepted his sacrifice, or whether they stupidly believed him will never be known. Be that what it will, slowly, slowly the globes drew nearer and nearer the barrier, nearer and nearer to the straining face of Troe inviting his death to save Lar and mayhap some of his kinsmen, nearer and nearer to the fear-frozen face of Onde peering out through the crannies between the wall of Torvan flesh he had built against the witch-fire.

Now suddenly, with one simultaneous darting motion, the cloud of globes, the huge fat one and the many swollen smaller globes, rushed at Troe, into his body, which quivered once and then froze stiffly in the swift chill of this dread death that sucks the all of a man out into the elemental's being.

"Now may the Gods watch over the Tlarg," swore Onde softly, holding still the dead form of Troe against the opening wherein had entered the last of his army, and dread was in his face. For the whole body of Troe turned swiftly green and writhed with the pulse of the weird undead life that had swept into him. And then with a scream of terror Onde leaped back, for instead of leaving on the outer side of Troe's body as Onde had hoped, the green globes oozed inward into the great throne room, the main hall of Blackspire.

NOW began again a rich feasting for the hungry, awful spirits Lar's wizardry had conjured up in her extremity. Their lifting savage round forms, mirroring the utter horror of their faces from the half-world of death, from the limbo where all things that should never have lived are

driven; their fell swoop upon the now shrieking, cowering Tlarg, casting aside their swords, their armor, struggling futilely to rush out into the outer space from which they had just fled in; all this was sweet music to the bound Lar in her green chamber of fire and she writhed against her binding ropes of the nettle fibre till the blood ran. Steadily her thought urged the green death globes on to the slaughter, and now at last there were of all the horde of Toad-men not one left alive.

And over the castle of Blackspire could be heard the half-mad laughter of Lar, the witch queen, exulting and weeping, sobbing, crying and cursing, for she knew, from watching in her yellow image globe, how Troe had died for her. Vengeance she had, but it came too swiftly after her loss for her to be benefited by it.

Now in all the pile of Blackspire were left only the bound Torvani at the entry windows; the tall green form of Lar bound against her black pillar within the green chamber; and the dead Tlarg.

Before Lar hovered the green globes of dread spirits of the past, waiting for the release she had promised for the work they had done for her. And her hands were bound, she could not work her spells. There was no one to release her, for the Torvani who had fought so gallantly outside were far off toward the lower bottoms, pursuing the last fleeing remnants of the Tlarg horde, the rear guard who had not been near enough to call down the green death upon them.

How long would these dread devourers wait? Lar's thoughts sought them, and they froze their weird minds against her, waited ominously for their reward. And well Lar knew what fate would be hers did she not do with them exactly as she had said. It was the doom that usually befalls those who call up the forbidden entities, the savage spirits who are condemned forever to Limbo. That fate was joining them in their endless torments, the grey emptiness of waiting that was their life. And could she not give them release from that, they would surely take her to themselves.

IT WAS a weeping, shaking Lar, who looked up from her despair to see her sisters' faces swimming toward her through the gold-lit blueness. It was a grateful

Lar who slumped to the floor with weakness as her sisters unbound her, helped her open the great book and prepare the spells that were needed. To return these spirits to Limbo was not enough. To release them from their ancient fate: that required wisdom, and that was what Lar had promised. Her father looked upon her ashen, dim-green face with fear, for even the studious Lar could not cozen the strength of Varuna into doing her favors, could not rule the fates that control the lands of Death.

It was a mighty conjure that the three sisters of the Lanvi worked, and vast were the fears their father held for their fate as they labored over their pentagrams and conjure marks and distillations of forbidden alchemicals. But at last the green forces that stood waiting in their swollen, sullen strength began to shrink, and at last there waited there before the shaking hands of Lar but one small globe containing one vague face. And Lar sank weeping upon the long lounge of gold embroidered green damask, for the face that waited for her work was the face of Troe. And she could not say the words that would banish him into the land of death and death's vague savagery. For Lar knew many things, but what that place was from which those souls came to her and to which they went she did not know.

And even while her sisters waited for her to say the word that would send Troe upon his way to Hell or what place it might be; even as her former Lanvian lover stretched out his arms to take her again to his breast; even as her father pondered the words with which he would bless his daughter's reunion with her former lover, her decision to return again to Peristan and her former home and ways; even as the Lanvians unbound the Torvani from the great entry ways and swung wide the bars to let the refreshing fluids pour through the dark bloody pile of Blackspire . . .

Lar stretched out her arms to the pale greenness that waited there before her with the sad face of Troe, her step-son. Stretched out her arms and with a fierce, weird cry touched her fingers to the swimming vague sphere of elemental force that was now the soul of the rightful ruler of Torvani.

As she touched the sphere, the green and hungry force swept into her glorious body, and she drooped, fell slowly, gracefull across the lounge. As she stiffened into death,

from her breast arose a larger, brighter bubble of witch-fire. And within the sphere shone two faces, smiling upon each other. And that was a strange, courageous smile upon Lar's face, where she lay dead.

Tearfully her two sisters did those things needful. And the last green sphere of elemental force vanished from the ruined castle of Blackspire.

Somewhere in space, the vast green face of Varuna smiled too. For he loves his children when they are brave and love gallantly and wholly.

AFTERWORD

A STORY ABOUT spirits, from me, who explains all spirit and religious phenomena as the work of the subterranean hidden people (who have duped all surface men for endless centuries with their ray-projections and ray-phone voices) needs some explaining.

I think that the history of the worlds in space, given in Ohaspe, has behind it certain vast truths. I think that the ether, the microcosm, other planets, all contain life which would often prove imperceptible to us, but is nevertheless there.

I think that some "things" that might act like we concept spirits as acting, could exist on earth except that the poisons from our sun make conditions for that type of life too difficult. If such things exist, they are even more ephemeral and less intelligent than man himself.

Thus I can write a story about spirits, if I place the story in another plane of life reachable only by a cavern mechanism that I have heard of but never myself seen, with a clear conscience.

I do not believe in spirits upon our present day earth. Such fragile forms of life could not exist here, where we find it so difficult for our comparatively sturdy bodies.

But that something of the kind might populate all the so-called "ether," all the voids of space, I do not dispute. I do not dispute that such so-called bodiless "entities" might even find their way to earth upon occasions, perhaps even frequent occasions. But I do not think they could stay alive here, where our radioactivity kills men in sixty to seventy years—and mosquitoes in weeks. Such a bodiless life would be slain by the first strong wind, or first spinning magnetic vortice from our sun, or the first touch of Pittsburgh smog.

In my stories, that something men call conscience will keep me from giving you anything I do not believe could be true—under the conditions I give you. It is quite probable that such creatures as Troe and Lar do swim in blue ethereal seas, far from our deadly sun, and that such sorceresses as Lar do summon bodiless "spirits" by force sendings, by obscure symbols

in forgotten languages, as all our legends tell us. These things may have been true in the far past on earth—all our legends tell us so—and I have found more important truths in many legends than in all the history books.

But these things are not true on earth today.

—Richard S. Shaver.

"HIGH-SONICS OPENS NEW HORIZONS"

By
H. C. GOBLE

IN PREVIOUS articles on supersonics, I have dealt with the more fantastic possibilities in this field . . . for such possibilities are more within the reach of high-sound than of any present force, including waves in the electromagnetic spectrum.

But already these out-of-the-world waves are accomplishing fascinating pocket-size miracles in down-to-earth industry, and there are few fields that they will not revolutionize within the next few years.

Already a laboratory sonic transmitter is on the market which gives cyclical rates between 400,000 and 1,500,000 cycles per second. The device is crude, and quite expensive, but it is a step in the right direction. For experimental purposes it opens up a vast new range of frequencies to the laboratory worker . . . and results obtained at these high frequencies are astonishing.

Volatile liquids such as the hydrocarbons, oils and benzines, form a highly inflammable fog when bombarded by supersonics. A sonic carburetor may be one startling possibility of this frequency, for no carburetor on the market can form such a perfect air and fuel vapor as forms under sonic bombardment . . . even heavy oil takes on the volatility of gasoline.

Unmixable liquids, such as oil and water . . . and the even more unmixable mercury and water . . . mix perfectly under high-sonic. At other frequencies the same perfect mixtures will separate just as perfectly into two distinct substances again. All colloids, emulsions and suspensions, either liquid or gas borne, can be separated instantly, the suspended material falling out of solution or suspension . . . which makes supersonics a winner for fog and smoke dispersal, and instant settling of water impurities. In two seconds a phial of sheep's blood at certain frequencies, will turn pure white, and all non-liquid matter settle out of it. This characteristic reopens the old dream of cheaply culling gold, magnesium and other chemicals out of the Gulf-Stream . . . for all the input necessary to operate such a sonic machine is standard 110 Volt A.C.

Liquids traversed by supersonic waves are already being used as optical diffraction gratings in

British Television. The waves traversing a liquid produce a spectroscopic light diffraction like that produced by a glass prism.

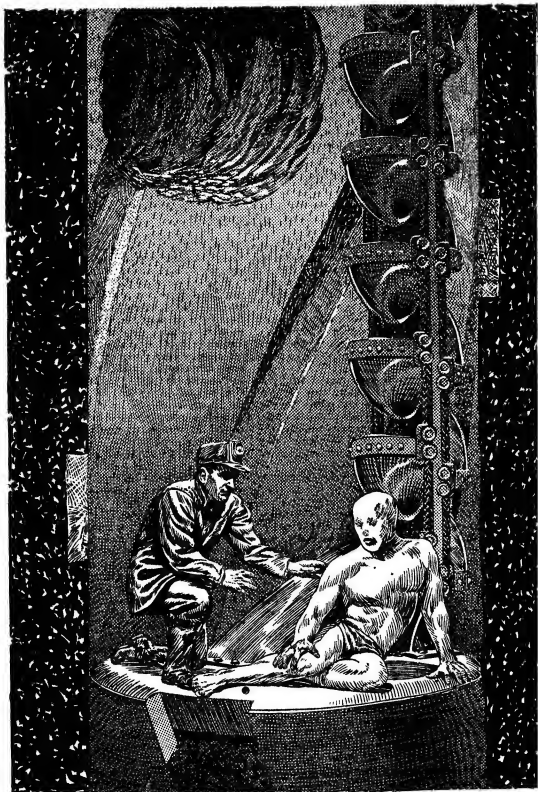
Infinitely varied as the possibilities are in inorganic chemistry . . . in biochemistry even more may be expected. Yeast cells lose their reproductive ability at some frequencies, and vastly increase it at others. Luminous bacteria lose their luminosity. A mouse exposed two minutes to 100,000 cycles acquires a body temperature of 113 degrees fahrenheit . . . while at other frequencies he becomes paralyzed. Anti-bodies, so vital in vaccines and inoculation work, are instantly shaken free of diseased cells. Germination time of seeds is tremendously decreased, and yield increased . . . opening up startling possibilities for multiple harvesting.

Name what field of endeavor you will, and supersonics can be called upon to do the job with bells on. The above is only a few of the effects already noted . . . and there are thousands more to come.

The new device which sells for around 2,000 dollars, is merely an improvement on an old principle. The Curie Brothers discovered that certain quartz crystals, especially from sections of Brazil, develop electric charges when subjected to pressure or tension. The same thing works in reverse. Subjected to an alternating current a quartz crystal contracts during one-half the polarity cycle and expands during the other half. The crystal thus oscillates physically in cycles duplicating those of the A.C. current fed into it. Thus it acts as a vibrator, creating sound waves. The power of these waves is at a maximum when the mechanical frequency of the crystal and the A.C. frequency are in resonance (or coincide).

This method is at its best very crude and limited. For each frequency a new crystal must be used . . . and radio crystals, cut to a 100,000th of an inch as they must be for even close accuracy, are very delicate and expensive pieces of equipment.

A better method of sonic production is called for, using electronic amplification and projection, flexible and unbound to pre-set frequencies . . . only then can this mighty tool come into its own.



"As I bent over him I saw that he had no eyes!"

SO SHALL YE REAP

(Continued from page 43)

than it had. He felt a little dizzy. More like an upset stomach. What had he had for breakfast? The corned beef hash was a new experience. Maybe that was it.

Suddenly he retched.

The rest of the trip was a nightmare to him. The small boat had risen on fifty foot waves, at least, as it carried him to the aircraft carrier.

The other had been concerned about whether the plane could take off from the deck of the carrier safely. He had silently prayed that it wouldn't, and been disappointed when it rose safely into the air.

The plane had taken a course to the north of the regular lanes, and it had been quite rough. More than once Jerry had been convinced his stomach was above or far below his body.

When the plane finally landed safely at the airport outside Moscow and he had been whisked, along with the others, away toward the city in an open limousine like the one he had pictured, in every detail, he knew with a kind of cruel fatalism that he would not be allowed to die.

So he resigned himself to the slow rocking of the earth, which was almost as bad as the rocking of the plane and the boats had been, and after a while it lessened. By the time the car drew to a stop in front of the hotel where they were to stay he could stand unaided.

THERE followed several days which seemed distinctly unreal to Jerry, and no doubt to Alex, too, although the first half of his life had been spent in surrounding much like these.

Jerry's mind was numbed to sensation. He met and spoke to Stalin. It was a fact in his mind that seemed divorced from emotional associations. For hours he stood or sat uncomfortably in the presence of fabulous personalities.

The king of England, who came at the insistence of the president who would accept no lesser one from the British government, took a personal liking to Jerry. Yet

even he, human as he was, remained in Jerry's memory later as only a more vivid detail of an incredible dream.

It took three days for Stalin and the king to completely realize and accept the fact of inevitable doom for all life on the Earth's surface. Another two days were required for them to catch up with all the possibilities that the American experts had explored. During that time they readjusted their views, as had the president.

They became calm men, coolly discussing the fate of the world together. At once they realized that all short range problems would have to become secondary. There would be no time to waste in petty, global wars for things that yesterday, and the day before, had seemed of paramount importance.

Power would have to be divided—not for the prestige and commercial advantage it might bring, but for the more facile domination of world events.

World domination by one nation would be suicide for all. Public knowledge of the impending state of affairs would be suicide for all.

A definite plan was worked out in broad outline. The only escape would be underground, in carefully sealed cave cities. They would have to be carved out deep under the surface, in living rock. The alloys, the techniques, were at hand. Boring machines and systems of carrying off the material carved out were the main problem. Constant mutual exchange of information would be necessary.

Methods of choosing and spiriting away the people who were to go down into the caverns would have to be mapped out in detail. The sudden disappearance of millions of people without arousing suspicion among the rest would be a major problem.

It was admitted by England's king and by the president that the life of any man who threatened the secrecy of the project must be forfeit. A new light was thrown on the value of any single human life. Here was a giant, sleeping animal—Man. He

MUST not be awakened, no matter what the cost.

Out of the womb of the sleeping giant, the egg (from which the future giant—Man, after the death of the radio-active monster—would hatch), must be hidden away in the earth where it could lie dormant until the time it could emerge.

Plans were outlined. Procedure to ensure secrecy were decided upon.

Then, abruptly, the plane was lifting from the ground and boring westward over Sweden, over Norway, and out over the ocean, always far up in the stratosphere, undetected.

There was an awful moment when the pygmy aircraft carrier loomed dangerously ahead. The sudden jar and jerk as the wheels hit the deck and the cable caught the tail hook and held the plane.

The small boat again became a part of the nightmare for Jerry, and was gone, to be replaced by the yacht. Unbelievably it slid alongside a dock. And by the time the long sedans with their smooth, rolling motion had slid innocently into the traffic of Washington, reality had descended with her calm, capable, comfortableness upon Jerry once more.

As if awakening from a dream, he welcomed the honks, snorts, and tire noises of cars in the traffic, as a baby chick welcomes the cluckings of a mother hen. He was back in Washington!

JOHNNY DAVIS was confused. Very confused. For the first time in his life he was confronted with things that didn't stack up. He had evidence—irrefutable evidence—that the president had never left Washington, and equally irrefutable evidence that the president had gone for a cruise in his yacht, had boarded an aircraft carrier, and had taken off in a plane, heading north.

What was this evidence?

First there was his very dear friend, Senator so-and-so, who had called up and TALKED to the president on some very vital matters three different times while the president was supposed to be away. He had called without warning each time and had been immediately connected with the president, without the least delay.

Second, there was the president's doctor who had informed the press on the progress of the president's cold each day, and had

been seen to call at the presidential mansion each morning.

Third, there was the statement from one of the crew of the president's yacht, and that man got fifty dollars each time he told Johnny the president so much as stepped aboard. There was no reason for the man to lie.

Fourth, in confirmation, the statement of the sailor on the aircraft carrier.

To add to the confusion, there was no word from his aide in Moscow. That wasn't too surprising. If the Russians wanted something secret they could easily do it—until the reporter came back to the United States.

The actions and movements of outstanding scientists was consistent in only one respect. They came to Washington quietly, and either left as quietly or remained and became grimly uncommunicative.

Switchboard operators in hotels had been replaced by unbribeable, new operators, or had suddenly become upright and honest. Telegraph procedure had suddenly undergone revision, and a new station had been opened. Some as yet undetermined code number must route certain telegrams through the new station, and the delivery boys from there were men with guns.

Rooms above and below, and on either side of visiting scientists and engineers were filled with strangers who had a habit of opening their doors and standing in them when anyone passed along the halls.

The scientists themselves could be approached easily enough, and a sizable chunk of expense money was going each week on drinks and food for their entertainment, but they wouldn't talk about their business in Washington, even with the promise that their names would be spread favorably all over the country.

Johnny was quite aware that he could not so much as whisper what he thought of the things that were going on without complete and irrefutable proof of every word he spoke. But how could he get it?

"I'll have to wait for developments," he muttered disconsolately.

His smile was grim as he left his office for more relaxing things—like a cocktail. He had run up against secrecy before. All he had to do was keep at it. There would be a slip here, a slip there, and he would put them together and get the picture.

He had a reputation that was known all

over the world. *Anybody* could send him a little tip, from the president's secretary down to the rear admiral's daughter, and be sure of a sizable reward, and complete protection of identity.

These scientists would go home and talk to their wives, children, and sweethearts. They would talk to their less scrupulous colleagues.

The elevator came and its doors swung open. Just as he was stepping into it his office door opened and one of his secretaries called him back.

Inside, she wordlessly handed him a sheet of paper. On it was an AP release. It said: "George Cramil, reporter for the Associated Press, was killed in an automobile accident while driving from Moscow to Leningrad. His car, going at a terrific rate of speed, plunged off the road into a stone wall. No one was with him at the time."

Johnny crumpled the paper in his suddenly constricted fingers. He paced the floor nervously, his face working in futile rage. George had been one of his few personal friends. They had been cub reporters on the same sheet, years ago.

"You know what this means?" he said, looking from one to the other of his three secretaries. "It means that George knew something."

His eyes darted to the phone, speculatively, then he shook his head.

"No," he exclaimed, as if answering his unspoken thought. "This is too hot to trust to the phone. It might be tapped."

Turning, he left the office.

HALF an hour later he was sitting across the desk from a dignified man with iron grey hair which had too much wave in it to be natural, and with a face that was too masculine to belong to a man who waved his hair.

Johnny was not aware of the inconsistency. He was talking urgently, in a low, bitter voice.

"You knew George as well as I did," he was saying. "I think he would have left something to show what he had found out. Something the Russians wouldn't guess. I don't think his death was an accident."

"You've got to send somebody to take his place. Give whoever you send instructions to go over George's stuff with a fine-tooth comb, but not to send what he finds. Keep it to himself."

"Or better yet, some code that takes a series of messages to tell. Something like the first word in the first cablegram, the second in the second, and so on. Then in a week or two we can have the dirt. Huh? Do this for me."

"Okay, Johnny," the man with the iron grey hair nodded his head gravely. "George was one of my best men."

Johnny left his office with a light of triumph in his eyes. Maybe, in spite of everything against him, he would get something to crack this thing wide open.

"If I can *prove* that the president was in Moscow," he whispered to himself, "That's all I gotta do."

CHAPTER IV

ORVIS G. OSHIBOSKI wrote his name with slow deliberation just above the line made of a series of short dashes on the official looking blank. The pen point poked through the paper three times, so that the results weren't too good.

It took him so long that he got a little nervous at holding up the slowly marching line of men.

He dropped the pen with relief as he finished writing his name, and followed behind the man ahead of him, his heavy shoulders swaying a little, his flat nose and huge jaw mute testimony that here was brawn, not brains.

The line was vanishing through a door up ahead. In a few minutes he would vanish up there, too. His expression showed that he was a bit nervous. The word examination scared him. But seven thousand a year for a laborer was worth the ordeal of an examination. What puzzled him was why you had to have an examination to get a job as a laborer. What was a laborer supposed to know, anyway?

That question was bothering every man in the line. What *was* a guy who didn't have any trade supposed to know?

Orvis' friend, Billy Nugent, on the Chronicle, who had argued him into applying for the job, said he didn't need to worry. Billy was a smart reporter. He and Orvis had gone to high school together.

Only two weeks ago Billy had come to his house to talk to him. He'd brought a quart of really nice stuff with him. Orvis had some ginger ale in the refrigerator.

They'd been talking over old times when

they were on the football team together in high school. Then Billy had brought out the civil service notice and the application blank.

"Look, Orvis," Billy had said, "seven thousand a year is a lot of dough. Some bank presidents don't make that much. In three years you can own a house as nice as mine, over on the south side where your kids can grow up to be gentlemen like me and earn money by their wits—not have to dig ditches all day out in the sun."

Then he had leaned over close, after glancing out into the kitchen to be sure Mary, the wife, wasn't overhearing anything, and said in a low voice. "You can make a lot more than that. The big boss in Washington, D. C., wants to know what's going on in there. The government doesn't start up the Hanford plant again for nothing!"

"Won't that be spying?" Orvis had asked Billy doubtfully.

"Of course not," Billy had exclaimed indignantly. "I ain't working for some foreign power. I represent the press. *You* know that's one of the things we fought for in the war; *freedom of the press*. And the government ain't letting the press in on this! That's unAmerican ain't it?"

Orvis had still looked doubtful, so Billy had clinched the argument. "You know me, don't you, Orvis? Am I some foreign b — d? Hell no! I went to school with you when we were kids together. And the big boss agreed to pay you two thousand bucks in cold cash when you tell me what they are doing in there. He only wanted to pay you a thousand, but I told him we went to school together, and I wouldn't settle for a cent less than *two* thousand, because I knew it would be worth that to him."

"How'd he know about me?" Orvis asked.

"He didn't!" Billy said disgustedly. "I knew about you. *You are the only guy I could trust* with such an important mission."

"I'll do it," Orvis had exclaimed, his face glowing with pride that his friend had such trust in him.

"Only you must keep it secret," Billy had cautioned. "Don't even let Mary know about it."

Orvis nodded. Intrigue. Espionage. These had been only words to him. Way

above his humdrum life as ditch digger for the Acme Plumbing Company. But now they were real.

He had signed the application blank and given it back to Billy, and Billy had mailed it.

Now he was going through the door and sitting down in a chair with a writing arm on it like they used to have in the study hall at high school.

Billy had told him to remember all the questions and tell him what they were. He hoped fervently that they wouldn't be too technical for him to remember.

A SKINNY, stoop-shouldered old guy with a vest and no coat passed up and down the aisles of chairs handing out question sheets. He slapped one down before Orvis and went on, leaving a faint, lingering odor of stale bread.

Orvis looked at the small, black type. The top line said:

"What would you do? Place a check in the square opposite the thing you would do in the following situations:"

He read over a few of the examples, and confidence returned. This would be easy. He couldn't go wrong. They weren't asking questions where you might give a wrong answer. Why, you could even put down something you *wouldn't* do and they couldn't prove it was the wrong answer.

The first question read:

"You are alone on a beach, and someone in the water is drowning. You can't swim a stroke. There are no boats or other devices which you can use to keep afloat to rescue the drowning person. (1) I would let the person drown—. (2) I would go out to save the person—."

Orvis thought for a minute, then put an x after the second choice. The second question looked simpler.

It read:

"A boat out in a lake is sinking. You row out to rescue the people on it. There are four people on it; two men and two women. None of them can swim, and neither can you. You can take only three people back with you, and the boat will sink before you can return for the fourth. (1) I would take the two women and one of the men—. (2) I would take the two men and the younger of the two women—."

Orvis put a check after the first alternative. The next situation made him frown.

It read:

"An apartment house is burning. Several dozen people are trapped on the roof. From the window of your apartment you toss a rope across to the roof of the burning building, where it is made fast to a chimney. You tie your end to a radiator. The people are panic stricken and start coming along the rope in a dense string, one right next to the other. You shout that the rope will not support more than three at a time, but they pay no attention to you. You have a loaded rifle in your room, and are absolutely certain that if more than three get on the line the line will break and they will all be killed, and the rest, on the roof will die in the fire. There are now five on the rope, coming across, and another trying to get on the rope. (1) I would shoot the two last ones on the rope and any more that got on it until the first three reached safety—, (2) Shooting any of them would be murder, based on my guess that the line would only hold three. I would let them keep coming, hoping the rope wouldn't break. If it broke, I would not be responsible—.

Orvis frowned. There was more here than met the eye. Why should they ask such foolish questions as these just to pick out a few laborers? Which would he *actually* do, now that the question had been posed? He tried to visualize the scene in his mind. If he shot any of them he would be liable for murder, and his only defense would be that he thought the line wouldn't hold more than three. If he let them keep coming, the line would break. Then he wouldn't be liable under the law for murder, but ALL the people would die. If he shot, he might only have to kill three or four before the rest got some sense in their heads. But you hang just as surely for killing one as a dozen, so the number he would have to kill didn't make any difference.

Another thought came to his mind. Maybe it was a trick question, a trap to make him admit he might kill somebody as the solution to a problem. If you would kill once you would kill again. That's why they hung people.

"I'll play it safe," he muttered to himself. "I won't answer it. If I don't get the job, at least they haven't got anything on me."

The questions took him two hours to answer. There were twenty-five of them,

all told. And each pictured a situation where you would have to do something, and no matter what you did somebody got it in the neck.

When he finished, the man in the vest told him that would be all. He would be notified by mail if he got the job. Billy was waiting for him in his car, and the two went out to a place on the north side where they had high-backed booths and the waitresses left you alone.

There Orvis repeated word for word the whole list of statements and his answers, while Billy wrote them down.

When the list was finished Billy looked it over, more puzzled than Orvis had been.

"What a list of sappy questions!" was his comment. "But I think you'll get the job. This is just a smoke screen and don't mean anything. And remember, if they make you promise not to say anything about your work to anybody, go ahead and promise. That's what our big spies in foreign countries have to do. Anything goes in war, and this is a war for the freedom of the press!"

Billy's next statement proved that he was a born psychologist. His face became grave and stern. His voice vibrated with emotion as he said:

"Orvis, we are all depending on you. The future of the whole country may depend on you. It is up to you whether we have a dictatorship, or whether we keep the democracy we fought for in two world wars. Don't let us down."

CHAPTER V

CATHERINE stood resting one black-gloved hand on the iron railing that separated the sidewalk from the airfield. The rows of lights that surrounded it cast a spotted curtain of gray shadow across the field with its concrete runs and black earth in between.

At her back was the depot and its banks of flood lights which made the surrounding area bright as day—to blend in with the lesser light of the field.

In the black, overcast sky, lights were drifting slowly downward, connected by some invisible structure that held them together, blinking monotonously their red, green, and white colors.

The lights spread slowly apart as they lowered, until at last they came to earth

at the far end of the field. At the same time the huge bulk of the four-engined transcontinental plane materialized, reflected the field lights from its aluminum skin.

The throaty roar of its motors burst forth as it picked up speed across the runway. At the last it performed a quarter turn, pivoting on one giant wheel, and with a final snort stood docile and silent.

Catherine stood on her toes and craned her neck, peering intently at the windows of the plane, hoping to catch a glimpse of her father and Jerry; but all she could see was the midsections of people, men and women, as they stood in the aisle ready to disembark.

A uniformed attendant was wheeling a set of steps to the plane. The door of the plane came part way open and the head of the stewardess appeared for a moment. Then the door opened wide and people started descending to the pavement.

Alex appeared, followed immediately by Jerry. Catherine waved one arm, steadying her body with the other gripping the rail. Jerry had seen her and was waving back. Then they were blocked out by the people ahead of them as they came down the fence-lined walk, like cattle to the slaughter in a stockyard.

Catherine waited impatiently, smiling and waving each time the head of Alex or Jerry bobbed into view. At last Alex emerged and she threw her arms around him for a moment, then delicately kissed Jerry on the lips.

She flooded the two with questions she gave them no time to answer, all the way through the depot out to the car.

Olly looked up as they came, and then opened the door and climbed out, holding himself erect with his right hand on the top of the car door, a broad grin of welcome on his face.

As the red Buick backed out from the curb and moved forward into the night, a dark green sedan followed discretely. Behind the dark windshield were two men, one driving, and the other with a pair of headphones clamped to his ears.

In the back seat a standard record player was running, its cutting needle peeling fine threads from a light-colored blank.

"What did you do in Washington?" the voice of Catherine came faintly, along with the hum of the motor.

"Nothing much," Alex's voice replied.

"And all that we did do must be kept secret, so don't keep asking us about it."

The voices became indistinct, so the man with the headphones leaned over the seat and twisted a knob on the record player. The motor noises came louder, but through them Catherine's voice could be heard.

"Did you miss me, Jerry?" she was saying.

"I thought about you a great deal," Jerry answered.

"He was the most love sick person I ever saw," Alex contributed with a chuckle. "It was sickening just to watch him."

"That wasn't lovesickness that was—" Jerry stopped abruptly.

"What?" Catherine's voice came, tantalizing.

"Something I ate that didn't agree with me," Jerry said hastily. "Some corned beef hash."

There was silence for awhile up ahead.

"This gadget works pretty good, doesn't it," the driver of the green sedan said to the man with the headphones.

"Yeah," was the answer. Johnny was right. "They haven't said anything, but the girl will worm it out of her boy friend as soon as they are alone somewhere. Wait and see. All we've got to do is see that they never get out of earshot of the recorder, and we'll get all the evidence we need."

"What about the transmitter in their car?" the driver sounded worried. "Think they'll discover it? If they do the gee men will be on our tails quick."

"Not a chance. That radio friend of mine worked on it all one night getting it in place. The box is fastened inside the cross beams of the frame, where no one could ever see it, and the mike is in the upholstery where it will never be found. The switch is in the seat. One of those long affairs so that any pressure anywhere on the seat closes it. The whole thing runs off the car battery and is tied up so that it doesn't show on the ammeter. It can stay where it is, and won't be found until the car is dismantled for junk."

"What about the house?" the driver asked.

"We've got mikes all over the place. And in Chadwick's apartment, too. None of them can say a word without it going down on a recording. Even what they say in their sleep will be recorded."

"That will take a lot of records, won't

it?"

"No, we just let them run, and if nothing is said we just cut them over again."

JERRY set his suitcase on the sidewalk and opened the sidewalk door to the stairs that led to their apartment, holding it open until Olly was inside. Then, picking up his suitcase he followed Olly's dragging figure up the stairs. He had dropped Alex and Catherine at their house and not stayed.

Upstairs, Olly said:

"Well, it's nice to have you back home again, Jerry." Then, putting his finger to his lips, he handed Jerry a sheet of paper.

On it Olly had typed:

"Be careful what you say. Somebody has put small listening devices all over the place. I discovered them two days ago."

"It's good to be back, Olly," Jerry replied. "How's your book coming?"

"Let's go down to the corner and have a coke or something," Olly suggested.

"Yeah," Jerry agreed. "I don't feel like turning in yet."

They went down to the street again and walked three-quarters of a block to Marty's Hamburger Shop. No one was there except the white-aproned waiter and cook.

Olly sat down in one of the booths, Jerry ordered two hamburgers and coffees and put several nickels in the juke box. When the strains of Cool Water, as sung by the Sons of the Pioneers, began, drowning out any other sounds within a few feet, Olly began explaining rapidly.

"A newspaper reporter called on me. He said his paper wanted to run a story about me and my work in their Sunday paper, and wanted a picture to go with it," he said. "The reporter took me down to the paper and had their photographer take several shots of me. When I got home I noticed that the easy chair had been moved slightly from where it always sets. I *knew* it had been moved. So I started looking around carefully. I found three black mikes of the button type, with fine wires leading outside. I didn't follow them up because I didn't know what I'd run into. There's one on the stairs and in the lab, too."

"Hmm," Jerry said thoughtfully. "I don't know what it's all about, but we'd better let somebody know about this."

"Another thing," Olly said. "You know that letter you sent me from Washington?

It had been steamed open, and I got it a day later than the postman left it. When I saw it had been steamed open I asked the mailman when he had left it. He said Wednesday, and I didn't get it until Thursday!"

There was a phone booth against the back wall of the cafe. Jerry had the waiter change two paper dollars for him, and then went into the booth.

"I want to send a telegram to Washington, D.C.," he said when he got the telegraph office. Then, after a pause, "To Washington, D.C., five five oh. The message is, 'Need help on microphone hookup. Setup wrong when I arrived.'"

After that he went back and sat down opposite Olly in the booth.

"We'll just ignore the mikes until we hear from the ones I just sent the telegram to," he said to Olly. "We don't need to worry so long as we don't talk about what I did in Washington, and we won't talk about that anyway."

"What's it all about?" Olly asked curiously. "You should be able to tell me about it. I'm your brother."

"All I'll say is that I wish to God I didn't know about it myself," Jerry exclaimed. "No matter what happens, don't even try to find out."

"Okay," Olly gave in. "Would you like to hear what I've been doing since you left?"

AT JERRY'S nod he began, eagerly.

"Life took two different courses from the initial, methyl alcohol stage at the beginning. Analyzing it from the laboratory data I have so far, I would say that from the very start, almost, it switched to the hydrocarbon molecule, too, so that the hydrocarbon and the hydroxycarbon forms developed. Their evolution should be easy to discover, up to the time the hydroxycarbon evolution developed the cell sac. The hydrocarbon couldn't produce a cell wall to protect it from environment, so it never got any farther than the petroleum stage. That is probably the source of our oil deposits; hydrocarbon life multiplying and seeping into the earth. It gravitated toward pockets where it stayed. The hydroxycarbons, with their oxygen atoms on them, finally developed to the point where they produced cellulose, which formed fine films around the reproducing substance. From

then on, in the protection of the cell wall, more and more complex molecules were possible."

"What caused the changes in the molecules as they kept on building up and breaking off, or reproducing?" asked Jerry.

"That probably was very common in the beginning," Olly said. "For each molecule that could reproduce, there were many different reactions possible that produced new molecular types. Some of these were life types also, and multiplied. After the first few changes, types were produced that couldn't possibly have resulted directly from natural chemical synthesis in non-living substances. And the Earth was getting cooler and cooler all the time, too. This cooling made more complex types possible, and probably ended the production of the petroleum types. Today, in the cracking process, where we make high octane gas, we have to put a little high octane in the petroleum vapor to start the process. The life principle in operation!"

"And to think," Jerry exclaimed, "that for all the untold centuries since man could tell the difference between living and non-living things he thought that life was due to some special *elan* that animated matter!"

"Yes," Olly said, a new note of gravity in his voice. "I wonder how mankind is going to take it? The proof that life is a perfectly chemical process will poke holes in most of the existing theories about the nature of man's soul, since they rest on the 'unknowableness' of the fundamental nature of life. To me, at least, it doesn't refute the existence of the soul, because you and I, being trained in science, have always felt that if man is immortal, there must be a material and perfectly normal vehicle of existence for his soul."

"That's right," Jerry agreed soberly. "To the man of the street, I suppose, matter with its atoms and molecules, making up bricks, dirt, oceans and all material objects, seems like something too common for construction of the immortal soul of a man. To the scientist, who sees in the atom something finer and more intricate than the finest watch, who sees in the workings of the universe something more majestic and Godlike than the untrained mind can even begin to appreciate, it is something else. I don't know how to express it."

"I know," Olly answered, his fine, intellectual face lighting up at the vision his

mind could encompass but hardly put into words. "One might as well try to give the uneducated man a word picture of the beauty of a mathematical structure as to try to put into words what a beautiful thing the universe is in its basic structure."

"Well," Jerry said with a sudden smile, "we might as well go home and get some shut-eye. Do you realize it's almost two A.M.?"

JERRY was not able to sleep. He lay awake and thought. And by one of those inexplicable coincidences that must occur quite often, since they are accidentally uncovered from time to time and must certainly go undetected most of the time—across the continent to the east the president was perfecting a plan which would permit the building of the caves as a security measure against attack. And in Chicago a group of engineers were putting the finishing touches on the plans for a tunnel borer which could carve an eight-foot bore through solid rock at the rate of two feet an hour.

In England the house of Lords was gradually bringing order out of chaos in its mad heterogeny of plans, all of which recognized the futility of boring underground in the British Isles.

And in Russia the Supreme Soviet was finally realizing that plans and ambitions they had nursed from their first beginnings were now meaningless. As one of them put it so aptly:

"Of what use is it for men to fight for the command of a sinking ship?"

The reasoning, capitalism and communism can't exist side by side, therefore one of them must go, had been met in an unexpected manner by Fate with her answer, therefore both of them must go."

At the same instant that Jerry, having decided that it might be possible that the race could be perpetuated underground, and that if this were so it was quite probable that he would be among those whose offspring would be saved so that there was no immediate reason for him to break off with Catherine turned over with a relieved sigh and went to sleep, the president was outlining the bold strokes of his great plan.

"First," he typed, "the cavern cities can't be started openly unless a proper excuse for them is given to the public. The only reason they might accept is one based on the threat of impending war. A war in which

the adversary also has atom bombs."

"Therefore," he concluded, "Russia must do something to make this threat seem real."

He outlined tentative things Russia might do. She might resign from the United Nations. On top of this she might hold an atom bomb experiment of her own someplace. Things calculated to make the public believe war was a certainty, and that caverns would be the only protection from atom bomb attacks.

Meanwhile the governments of all countries could carry on the work of carving out long tunnels far under the surface, and huge cavern cities a mile or so down, in solid, unbroken granite.

While in Russia the president had made plans for the installation of direct, wired television with Stalin on special frequencies. This installation had been in for two days now.

It took only a few minutes for the president to contact the Russian Premier. Stalin agreed that the plan was not only feasible, but perhaps the only feasible plan. For several hours the details of the plan were discussed. The great danger of the plan would be that some incident might touch off public opinion in either country and precipitate an actual war. They both agreed that if they themselves each announced often and emphatically that the other would have to make the first definite, hostile attack before they would agree to an actual war, that peace could be maintained.

CHAPTER VI

IT WAS a peculiar state of affairs that existed during the winter of 1947-48. In all past history the common people of inimical countries had not wanted war. It had been the leaders who worked up the war spirit to the point where the common man felt he had to fight—for patriotism, to preserve his freedom, to get the other fellow before he got you, or to rescue some 'friendly' nation which you conveniently forgot had been knifing you in the back before he was attacked.

If the fate of the world had not been irrevocably fixed by unforeseen circumstances, indications were that Russia would have resigned from the United Nations and declared a Monroe Doctrine for Europe, and after that for Eurasia, and precipitated

another world conflict. And that the English-speaking world would have welcomed it in the hope that the threat of communism would be ended by that war.

If Alex Topanov had not figured out the last, awful consequences of the simple explosions of five atom bombs, perhaps that is the way history would have run. Then the nations would have awoke to the fate of humanity with its time shortened by a full century, and mankind would have gone down to utter extinction.

But during that winter the people of the world cried for war, and the leaders held them back with the stall, "Let the others cast the first stone so that our victory will be justified in history." Only instead of a stone it would be an atom bomb.

In October Russia resigned from the United Nations. The papers predicted war within twenty-four hours with daily regularity. Toward the end of October the British Government moved to Canada, and an evacuation of the British Isles began, which lasted throughout the winter, until there were less than fifteen million people left in all the British Isles. They went to Canada in passenger liners and freight boats. They had private staterooms and they had floor space in the hold of the ship. After the Russian atom bomb experiment the Britishers came over densely packed, fasting until they reached America because there wasn't room to carry food on the ships that brought them.

The government leaders and scientists of the world, knowing the secret reasons for the migration, prayed that no ship would meet with disaster. If just one of the ships sank it could mean the overthrow of a government and open war. For it had been decided that open war was preferable to revealing the secret and loosing a panic upon the world that would almost certainly defeat the plans to save humanity from extinction. Fortunately, not one ship met with disaster in the "migration," as it became known.

Thousands died after reaching Canada, from malnutrition, exposure caused by the impossibility of finding shelter for nine-tenths of the population of the British Isles in the bleak winterlands of southern Canada, and disease contracted on the ships in spite of all precautions.

For the emergency both the United States and Great Britain moved all avail-

able ships into the Great Lakes, where they were anchored off the Canadian beaches. These housed over two million of the migrants. Other millions were sheltered in flimsy quonset huts, store rooms, and even tents.

There were almost daily tragedies. On Christmas day a huge circus tent housing five thousand women and children caught fire fatally, burning over eight hundred of the women, and sending almost a thousand to the hospitals with serious burns. The migrants living in the hospitals had to move out almost en masse, with no place to go. Many of them died of exposure.

ON THE surface there was the greatest war hysteria ever known. Underneath, the leaders and technicians who knew what was going on moved quietly and in harmony. Before the spring of 1947 they had grown used to the certainty that their every decision meant loss of life and property. Such consequences were inescapable.

But, just as a mass of U-235 rests quietly in its container until it reaches a critical mass, then in a few awful seconds unleashes its titanic energies to throw cubic miles of water into the heavens and send seismic waves, through the earth, to cause earthquakes months later in the nodal areas of the waves, so also the state of affairs in the world of men, as it was during that winter, gradually reached the critical mass, or stage of complexity and development, where it could be touched off by adding just a little more. Hindsight is always infallible. By the summer of 1948 the world leaders could see that what took place was inevitable. But in the fall of 1947 it seemed only possible but not probable.

Certainly it was only a remote possibility on that morning in September when Jerry's telegram to the Secret Service, informing them of the planted microphones in the apartment, was laid on the president's desk. It lay there for half an hour while the president continued his discussion with Stalin of the pros and cons of the plan to use war hysteria as the motivating force for building of underground cities, all interconnected, deep in the bedrock of the Earth.

Two hours later, however, a jet plane took off from a field near Washington, D.C., and sped across the country; and in the course of time one of the several young

men in the secret service that Jerry and Alex would know by sight knocked on the door to Jerry's apartment.

Jerry recognized him at once, and guessed he had come because of the telegram.

"Hello, Hugh," Jerry exclaimed. "Come on up. My brother, Olly, is out right now, so we'll have the place all to ourselves." He turned and led the way up the stairs, pointing silently to the small mike placed inconspicuously above a strip of molding near the ceiling of the stair well.

The young man, Hugh Montague, nodded grimly. In the apartment the two carried on a casual exchange of patter while Jerry pointed out the other mikes, and the fine wires leading to the outside.

Finally Hugh handed Jerry a typewritten sheet which read:

"From now on, ostensibly, we are threatened by war, and all our actions and discussions will be based on the theory that we must hasten defenses against an aggressive war by Russia.

"Therefore you are at liberty to divulge to your brother in this apartment that the purpose of your visit to the Capital was for the purpose of co-operating in the design of atomic power to drive boring machines which will be used to construct atom proof shelters beneath all the major cities, with connecting bores so that any catastrophe in one section can be dealt with without exposing our defenses to attack.

"In line with this plan you will shortly receive an appointment actually to participate in the perfection of atom motor design at Hanford, Washington. Dr. Topanov will remain at the University and carry on studies aimed at nullifying, if possible, the eventual effects of that with which we were concerned in our recent discussions.

"No further mention will be made of the Topanov-Chadwick Report except in the protection of the Capital. All activities directly connected with that report will also remain secret. If at any time it becomes necessary to discuss some phase of the report, use the code word, aeroplane, with that spelling.

"Discuss the fictitious reason for your trip to Washington with your brother with great reluctance, for the benefit of those on the other end of the listening devices. Don't be alarmed, as we will be very careful not to let anything happen to you."

It was signed by the president.

When Jerry had finished reading it, Hugh crumpled it up and placed it in an ash tray, setting fire to it. Both men watched until it was nothing but embers. Then Hugh poked at it until there was nothing left except fine ashes.

JOHNNY DAVIS sat in his office, alone, and with his feet resting on the glass surface of his desk. Fresh in his mind was all the latest data on the present events. He was sorting and analyzing it.

Highest on the list in importance was the half-dozen records flown from Seattle, giving the conversation between Jerry Chadwick and his brother, Oliver Chadwick.

It revealed that there was secret government information, as yet unknown, which indicated that Russia was making atom bombs. The danger seemed so great that the United States and the British governments were making hasty efforts to build bomb proof shelters under all large cities by perfecting a huge, automatic boring machine, powered by atom motors.

Chadwick was awaiting orders to go to Hanford to work on the motors. Topanov was to remain at the university and make further experiments with the theoretical aspects of the source of atomic power.

A lucky break had enabled a reporter in Chicago to find out that an experimental model of the boring machine was being built. It was being rushed, and there were more technicians on the job than workmen.

From England Johnny had a report that there was an extraordinary convening of the Parliament, and that reporters were barred. This by itself did not mean anything in particular, but coupled with all the other information it could mean a lot—especially since it had been going on for two weeks now, with no sign of the members getting ready to go back home.

One collection of items puzzled Johnny. It appeared that hundreds of freighters in Pacific ports and graveyards of the inland waters of the Pacific coast were being hastily manned and moved through Panama to the east coast. Most surprising of all was the fact that three out of four of the crews were Canadian, from the captain on down. The ships carried only ballast, and the crews knew nothing except that they were being paid almost twice the union scale.

These empty ships were moving through the Panama Canal at the rate of ten a day. Some of them were ships on regular runs, which dumped their cargoes in California, Oregon, or Washington, and then went to the canal instead of back to South America.

The reporter to replace George Cramil in Moscow had reached Russia, and should be starting his secret report in a few days.

As yet, Orvis Oshiboski (Johnny smiled every time he thought of the name) had not been hired for the Hanford job. If and when he was, he would serve as a check on information from other sources.

All in all, Johnny felt that something really big was underway, but there was not enough to go on. News on other fronts was plentiful.

The strike situation was getting worse daily. Congress was debating legislation to relieve the meat shortage, and getting nowhere. A bill had been introduced which would make farmers register all livestock, with stiff penalties for violations. Then the farmers would be told when to market their stock.

Meat rationing would probably be back by the end of the year, with registering of meat in private cold storage boxes, and stiff penalties for violation.

Confidential reports indicated that several large companies were building plants in South America to get around labor problems. One of the nation's leading industrial magnates was rumored to have applied for Bolivian citizenship, although there was no verification of this rumor.

Johnny took his feet off his desk and pulled out the typewriter and began to type out his news program for the day. At the top of the sheet he wrote the date, October 1st.

ON OCTOBER second, Russia resigned from the United Nations. Molotov was not present. An unimportant aide read off the letter of resignation of his government. It began with the word, whereas, which was followed by two thousand words listing all the grievances against the setup and actions of the United Nations. Then followed a statement setting forth Russia's policy for the near future. There were two main sections. The first stated plainly that Russia would wage no war of aggression. The second stated plainly that Russia would use troops to oust British and Ameri-

can troops from any European or Asiatic country.

The document was explicit and complete. Within a certain area of the world, definitely described, Russia declared a Monroe Doctrine. But in addition she declared that no matter what the grievance she would not send troops outside this area, either for defense or aggression. Furthermore, she would make no military pacts either for mutual defense or attack with any nation outside this area, nor would she honor any such pact made by any nation within her announced sphere of domination.

For two days the papers carried nothing but this news on their front pages. Murders, strikes, and politics went to the inside pages.

But not even Johnny Davis, the scoop-hound, suspected that the president of the United States was the author of the first draft of this Russian Monroe Doctrine and much of its final wording, and that it had been approved by a secret Congressional committee, and also by a similar special committee of the British House of Lords before being handed over to the United Nations group.

The secret wires from the Kremlin and the White House and Buckingham Palace were hot practically twenty-four hours a day as discussions of every phase of the world problems went on. Not every nation was in on it. Some nations had governments too unstable or leaders too temporary to trust them with such a serious responsibility.

On October third, the president spoke to the nation over the radio. In his speech he said he believed Russia when she declared she would not attack outside her sphere of domination. And he reiterated the nation's time-honored policy of not attacking until attacked, and said that since Russia had explicitly marked her sphere, so long as she did not violate her own word it would be respected by the United States.

Attacks began against the president's speech almost before he finished it. The Senator So-and-so who was a special friend of Johnny Davis cried out that it was tossing beloved France to the wolves—or in this case the bear. Cries of appeasement went up on every hand. The almost impossible labor situation was pointed out as evidence of the incompetence of the president, and coupled with his policy toward Russia gave

the senator a pliant audience for his cries for impeachment.

On the evening of October fifth, senator So-and-so made an impassioned speech in which he demanded the country impeach the President and hold a special election for a short term president who would use the atom club that the U.S. alone held to beat Russia to her knees and rescue France and Poland from the slavery of communism.

Two hours after he finished, when the special editions of the daily papers were hitting the streets with his speech printed in full on the front page, Stalin impassively announced at a special news conference that Russia would hold her own atom bomb experiment. The news stunned the English-speaking world.

THE entire, verbatim interview went over the radio in half an hour, to be followed an hour or two later by further extras on the streets. It went as follows:

Moscow, October 5, 1946:-(U.P.) Oscar Janas, U.P. correspondent. With no advance warning Premier Stalin called a news conference today. Half an hour after I first learned of it and was whisked, almost without ceremony, to the building where the conference was to be held, Stalin appeared with a staff of interpreters and made his announcement, reading from a prepared paper. The text of this paper is as follows:

On Tuesday, October fifteenth, an atom bomb will be exploded in a wasteland in Siberia, far from human habitation. This explosion will not be a repetition of the experiments conducted by the United States, but will be to determine the effectiveness of the atom bomb for defense.

Due to special construction of the bomb, it is hoped that the blast will expend itself in a horizontal direction. The bomb will be fired from a specially constructed gun on the ground and will be set to explode at a height of twenty thousand feet.

There will be two-hundred robot-controlled dummy planes flying at various distances and heights from the blast and also instruments on the ground directly under the blast and for many miles in all directions from it, to measure the concussion that reaches the ground, and also the extent of radiation and its intensity. In addition there will be many specially constructed cameras to record the blast.

The object of this experiment is to de-

termine whether the atom bomb can be used effectively, with relatively little danger to life on the surface, to repel an attack by air. The success of the experiment will depend on the construction of the bomb, and will be a success or failure, depending on whether the design confines the blast principally to a thin, horizontal plane, or fails in this purpose and permits the blast to reach the ground.

Due to a new type of neutron reflector the bomb will not need to be as large as those used by the United States. The new reflector reduces the critical mass almost half.

Observers from the United States and Britain are being invited to observe the effects of the explosion, just as we were invited to observe the Bikini experiments.

There was a stunned silence after Stalin had finished his calm reading of the paper. Finally a British reporter got back his voice.

"Then Russia now has the secret of the atom bomb and her own plants for manufacturing them?" he asked.

"Of course," Stalin replied. "And we also have the world's largest deposits of pitchblende. Our geologists estimate that we have over two million pounds of uranium accessible for atomic power within the borders of the Soviet Union."

By this time I had regained my own voice. I asked:

"Do you have, or are you making bombs of the type used at Bikini?"

Stalin smiled and ignored my question. But from his smile I gathered that Russia has bombs on hand. Whether this is so, or if Russia has just been able to gather the materials for the one bomb, and is staging a gigantic bluff in an attempt to back up her recently-declared Monroe Doctrine for Europe, is anyone's guess.

Seattle, Wn. October 5, (U.P.) Dr. Topanov, world's greatest atom scientist, today said that Russia probably is not bluffing. His statement is as follows: "In my opinion, the Soviet Union is in a better position to wage atom warfare than any other country in the world. Her population is for the most part decentralized. Two bombs, one dropped on Chicago and the other on New York, could wipe out a good percentage of the population of the United States. No two bombs dropped anywhere in Russia could wipe out more than a small fraction

of one percent of its population.

"It is well known," Dr. Topanov continued, "that Russia contains considerably more than half the world's known heavy metal deposits. In addition, she has the know-how in industrial technique. If she now knows how to manufacture the materials that make the atom bomb, and has plants like ours at Hanford and other places, she can catch up to us in atom achievement if she has not done so already."

THIS was followed by a bitter statement from Senator So-and-so in which he said that if the president had taken his advice we could have brought Russia to her knees before she had a chance to get atom bombs. This seemed a trifle illogical since the senator's advice had been given just two hours before the Soviet announcement.

No one knew of the B29 that had taken the bomb Russia was to use for the experiment from the United States to Siberia. No one knew that the men who would direct the experiment were officers in the United States Army. They were men of the growing group who knew the secret of the world's coming doom, and therefore could be trusted to keep their secret.

Not all who were let in on the secret could be trusted, in spite of the precautions taken to find out the beliefs and integrity of the men beforehand. But all were closely watched, in secret, and many met with "accidents" just before they could let the secret out.

On October fourteenth, the first boring machine bent its nose downward a mile south of the southern tip of Lake Michigan. It ploughed easily through the soft stone that underlies the dirt in the basin around the lake. The engineers pronounced the trial a success.

Announcement of the success of the boring machine quieted somewhat the panic created by the worry over what Russia would do with the atom bomb. In fact, many people were sneering disdainfully as the hour for the Russian experiment neared, and saying:

"Let them have the atom bomb. We've got protection against it now."

Others pointed out that having a machine to carve out protection against bombs, and having the protection, were two different

things. That Russia, if she had the bombs, might strike at once before bomb shelters could be built.

Still others pointed out hopefully that maybe the Russian bomb would disrupt the substructures of Siberia and cause it to sink beneath the ocean level, thus reducing the size and population of Russia to such an extent that it wouldn't be a threat to the world.

THE morning sun of October fifteenth crept up over a bleak horizon in the northern wasteland where the bomb was resting in the maw of a huge cannon.

The white landscape was cut by a lone file of wooden poles which led from the black area of cannon and buildings to the horizon on the west. It was over this wire that the signal would be sent that would start the bomb on its journey into the stratosphere.

Here and there over the landscape were smaller dark spots where cameras and other equipment were placed. Invisible, though still an important part of the ground equipment, were the various wild animals in the area.

The sun had just shaken off the last, clinging tendril of horizon and paused briefly before beginning its upward climb, when the droning of many planes came from the southward hills.

Far up in the clear sky dots emerged, widely distributed. The foremost ones passed overhead and kept on toward the north, until at last the sky was evenly dotted from horizon to horizon with widely spaced planes.

A puff of smoke rose from the mouth of the huge cannon and a silver streak climbed rapidly into the heavens. Before the sound of the cannon blast could travel a mile a sun came into being in the stratosphere, growing with unbelievable speed so that it spread over the heavens faster than the eye could measure.

The huge sun changed from flaming heat to calm, white quiescence; and through the newly born clouds drifted crippled planes, to plough their noses into the white snow below.

The snow itself, which had been sharp and crystalline, took on a glistening, glassy appearance, after awhile; and after the last plane had fallen, and the crash of its fall had echoed and re-echoed into oblivion,

silence crept cautiously back from the distant places and sat uneasily on its disturbed throne.

Only the faint, almost inaudible clicking sounds from the instruments as they sent their messages over the wires that hung from the poles, disturbed the blanket of quiet.

At the other end of that solitary line of poles, miles away, activity was intense. Men in the uniforms of the Red and the United States Army dashed from teletype machines to plotting boards. And out of their activity was arising a complete picture of the explosion.

It had been a success. A complete success. But there were several peculiar and unpredicted effects. For one, the atmospheric pressure as recorded by the instruments on the ground had rapidly dropped from normal to almost nothing during the explosion, rising slowly back to normal.

Beginning about three miles from the center of the blast a pressure wave had traveled along the surface. This wave, beginning almost imperceptibly, increased in amplitude for a mile, indicating that it was fed from the upper atmosphere, then decreased with the inverse square law. It traveled almost fifty feet faster per second than sound, and was about half a mile thick.

The explosion itself concentrated its blast in a plane about two thousand feet thick and spread out on a radius of nearly seven miles, collapsing and buckling the parts of all planes in a two hundred square mile area.

Radio operators were busy transmitting the data as quickly as it became available, so that in every major city in the world the man on the street knew almost as much as the men on the spot.

The man on the street was jubilant. The defense against the atom bomb was the atom bomb! The few thousands who knew of the insidious cancer that would destroy life in three more centuries were regretful and sad, for they knew that the experiment would shorten that time by a few years, and that a major atomic war might cut it to less than a century.

ON OCTOBER twentieth, the British government announced to the world its intention to desert the British Isles. On the same day the first twenty ships left

England with their human cargoes for Canada.

Russia was silent. The president of the United States made a statement to the effect that his government would aid in the migration in every way possible. His use of the word, migration, hit the public fancy, and from that time on the exodus became known as the migration, and each one who came over during that period became tagged for the rest of his life as a migrant.

Several writers from the United States went to England and came over with the migrants to gather material for books, which became immediate best sellers.

CHAPTER VII

DURING October and November the seething volcano of public unrest began to grow. Senator So-and-so, emboldened by the favorable reaction to his speech against the president, began a systematic campaign, with material supplied by Johnny Davis which he dared not use himself because of lack of evidence, which did much to stir the masses.

He could, and did, say that from an unimpeachable source he had definite assurance that the president had visited Moscow secretly. Called before a Senate Committee he refused to divulge the source of his information, simply repeating:

"Let the president appear on this floor under oath and deny that he made such a trip. Then I will retract my statement publicly."

The president's answer to this was:

"It would be silly for me to treat seriously the rantings of the senator and play into his insane campaign of heckling to the extent of appearing on the floor of the Senate to state for his benefit something which should be obvious to anyone with common sense."

Senator So-and-so visited the various labor leaders, making sure that the newspapers played up these visits. Immediately after, new union weapons came into play. In Chicago a strike brought into play one of these new weapons. Butchers were forbidden during a strike of an entirely unrelated group to sell meat, what there was of it, to anyone who could not produce a union membership card.

By the end of November every union

member in the country had one of the new "fight" cards. They were wallet-sized. It was threatened that by the spring of forty-seven no one could buy anything without one of these cards.

Organizing campaigns were speeded up. The threat of the fighting card produced results. Farmers were organized under a union. Small business owners also had to join. The motto of the unions became, "everyone in a union by May, forty-seven."

In spite of the threat of the fighting card large groups held out, and very few farmers joined. One large farm group that had been in existence for many years openly defied the unions.

The union answer was to call strikes in all farm machinery factories, and prohibit sales to farmers without fighting cards after May first, 1948—several months away.

The president stepped in and ordered the workers in the strikebound farm machinery plants to return to work. Riots resulted, and the president sent in troops to enforce his demands.

The Christmas Riots, as they became known, were the beginning of the open rift between government and labor. G.I.s, who were disgusted with the housing shortage and the continual strikes went back into the army.

Accusations were tossed about indiscriminantly. The housing shortage was due to governmental stupidity, to shirking of the construction workers, to strikes, to everything that could be remotely connected with it.

Real estate prices shot up so that a house which had been priced at five thousand in 1930, and at fifteen thousand in the fall of 1946, was priced at fifty thousand dollars by the first of January, 1948. No house could be rented.

The idea of the co-operative apartment house spread, so that by December, 1947, many apartment house owners were selling their apartment houses by apartments. A good example of this was the owner of a north Chicago, twenty-apartment building, who gave notice of eviction to all his tenants and offered his apartments for sale at thirty thousand each. Records showed that he had bought the building for twenty-five thousand dollars in 1935.

Christmas toys of the same identical design and construction which had sold for less than a dollar in 1935 sold for as high

as twenty-five dollars in December, 1947.

The man on the street in that same month was wearing a sport shirt, doubtfully sanforized, price fifty dollars, a summer weight sport coat, price seventy-five dollars, a pair of sport slacks, price sixty dollars, and a pair of perforated sport shoes, price twenty-five dollars. Suits were selling for three hundred dollars. Dress shirts, dress shoes, and most other items of wearing apparel were not to be had.

The sensible person who bought any article of clothing had it entirely resealed before wearing it. The resewing cost an additional four dollars for a sport shirt which itself cost fifty dollars and was made of cotton or rayon.

Turkeys which sold for eighty cents a pound for Thanksgiving shot up to a dollar thirty-five a pound for Christmas.

Unions struck for a living wage for the worker, and by the time their demands were granted, the "living" wage they asked was inadequate.

OSWALD SPENGLER, in his *Decline of the West*, stated that in any system of government there are certain good points and certain weaknesses; and that eventually the weaknesses grow to such proportions that they destroy the system.

A man owns many houses from which he derives a modest income during ordinary times in the form of rents. He can sell these houses for about what he paid for them, but if he does he loses a source of income in rents, so he keeps them.

Suddenly property values shoot up because of the housing shortage. The owner is able to sell for a profit that is greater than several years' income from rents. He sees that in a year or two the housing shortage will probably end, and values drop back to normal, so he *sells*, planning on buying again when values drop. Real estate values grow, until a working man must pay more than he can earn in a normal lifetime for a house in which to live.

A shirt manufacturer has made a fair living supplying all kinds of shirts. The demand exceeds the possible supply, so the government clamps on price ceilings, but leaves them off sport clothes. The manufacturer, caring only for the profit, makes sport shirts, forcing the man on the street to wear sport shirts in the winter and the summer alike.

The butcher, selling his meat on a profit basis, sells a piece of meat to a man for three dollars, knowing that the man cannot afford to pay more than a dollar for it out of what he earns. The profit motive blinds him to human values. If the butcher down the street could sell the same meat, or ANY meat for a reasonable price, *he* would have to sell at a loss or lose all of his investment. The butcher makes sixty cents profit on the three dollars worth of meat, where he sold it for sixty cents and made twelve cents profit in 1935. It is his legitimate profit, on a percentage basis.

The farmer raises beans and plows them under because he can only make six cents profit a pound on them in 1947, where he was glad to *get* six cents a pound for them in 1935. The pressures of monopoly, which in times of plenty could only be used by huge corporations, and against which laws were passed to ensure free competition, became the common weapon of the little man—the man who owned a house he couldn't use, and for which there were ten thousand buyers with money and no place to sleep, the man with ANYTHING, and people without it who need it and can't get it.

Who was to blame? The government? The labor unions? The property owners? The farmers? Or the capitalist system? It really goes down to two incompatible principles that exist side by side in the profit system, eternally in conflict, their warfare balanced in ordinary times, but thrust out of balance by circumstances. These principles are: (1) to make as much profit as possible in any business transaction, and (2) to get as much for your money as possible.

In a stable system the average individual gets as much as he produces in dollars and man-hours. If he gets more than his share it follows that some must get less than their share. If he sells a house and makes a profit that is equivalent to the wages of the average man working for two years, it means that the average man must work two years for nothing to make it up. It is inescapable.

Your answer:

"Should I pass up an opportunity to make a huge profit legitimately just because, in the last analysis SOMEONE must work to earn the profit I made; even though it will never be me?"

Who knows? And what difference will

it make in three hundred years? Hitler said that the weakness of a democracy is that no individual is responsible for anything. You feel justified in depriving the average man of the fruits of two years' labor for the sake of your individual profit on a deal because you are not responsible for the welfare of anyone except yourself and immediate family.

The average man demands through his union an exorbitant return for his labor because he is not responsible for the welfare of the owner who wants to make a profit on his product. He tries to get out of that two years of working for nothing by increased wages. The employer tries to get out of it by raising the price of his product. The buyer tries to get out of it by raising his own prices.

And in the end no one gets out of it. It is simple arithmetic. If you produce a dollar's worth of wealth and get three for it, SOMEONE must produce two dollars' worth for nothing. "But not me!" You hear someone whisper. Maybe not. That is the lure of free enterprise, and its reward. And also its weakness when it gets out of bounds.

THE least to blame is labor, for labor produces most of the wealth and reaps only part of the fruits at any time. But its relative innocence is due not to its purity but its position in the scheme of things. Consisting of the workers, the creators or inventors followed by the actual workers who turn out the products of invention in large volume, whether these are new types of vegetables or a book, a hunting rifle or a washing machine, the laboring class is for the most part a passive pawn in the chess game of national industry and politics.

The laboring class not only produces the wealth, it also buys most of it. But in buying it loses out, for it must support the property owner, who does no work, and the host of stockholders who do no work. In addition it must support the entire framework of government and government works, regardless of all tax-the-rich laws. This is compensated for by the fact that the average worker does more than his necessary share of producing wealth, in normal times. The ratio of the wealth produced to the buying power gained by the average worker determines the stability of the system.

If production of wealth increases, in the

form of manufactured products and food-stuffs, while buying power gained decreases, or increases more slowly, the system eventually breaks down. In 1929 credit buying disrupted the system in that way.

If buying power increases while production of wealth drops below normal, inflationary tendencies and monopolistic practices disrupt the system. During the period from 1939 to 1945 production of wealth was by-passed to instruments of warfare, so that buying power increased while available wealth produced declined.

Scarcity created millions of monopolistic corners in markets. The system broke down again. People with lots of money slept in parks and went hungry. A depression in goods instead of buying power set in. The reverse of 1929, but just as evil.

In 1929 a man did not have an electric toaster because he had no money to buy it, so the man who made them lost his job because there was no market.

In 1936 a man did not have an electric toaster because the man who made them could not earn the bare necessities of life by making them, so he struck for a living wage. Why not? Hadn't he saved enough during the war to live on during the strike?

Thus it was. And with the threat of war, the constant attacks on the government, and the final crystallization of power over labor in the hands of a few men, the stability of the economic system went completely overboard. Then it was ripe for self-destruction.

Little things. They are the straws that show which way the great, invisible winds are blowing. The hijacking of a truckload of soap. The condoning of the black market openly in the press as the only defense against O.P.A.

The farmer who found an envelope in his mail box containing money for a calf a meat-hungry city dweller was stealing, who promptly went out to the pasture and shot the "thief."

Scarcity of lumber in the middle west because of a shortage of cars to bring it from the western mills where it is piling up, and a scarcity of lumber in the west because it is needed in the middle west and the mills are on strike. Favoritism in selling, so that a home owner has to pay a carpenter fifty dollars to put in a two dollar plank because the lumber yard will only sell to the carpenter; so that the personal friend

of the grocer can buy shortening, while the average customer is told there is none.

Selling a thing for ten times its value because someone is in dire need of it. Forcing a man to buy something he has no use for to get something he needs. Stupid little things.

But little things like atoms make an atom bomb, when there are enough of them. They must be separated, and the evils allowed to dissipate, to prevent the explosion. When they are brought together . . .

THE man who shot the president was never found. The papers insisted that it must be a communist who acted on orders from Moscow. That seemed hardly probable, and certainly Russia took no advantage of the situation, so if the deed was directed from Moscow it was a meaningless, senseless act.

There was no way it could have been prevented. He insisted on taking his walks each day. To have adequately protected him would have meant evacuating a fair section of the Capitol city each day, while he took his exercise.

It was February twentieth, a cold, bleak morning. At eight A.M., almost to the second, as the president was walking along a sidewalk, his shoes making crunchy sounds in the hard packed snow, he suddenly stiffened, then toppled slowly forward.

The bullet was a high-powered, steel-jacketed one that entered just above the heart, breaking a rib as it plowed inward to the heart. Death was instantaneous.

Up until that instant no one had realized what a governor he had been on the fly-wheel of the growing juggernaut of unrest in the country.

From that instant on the wheel ran swifter and swifter. Two days later a judge who had been strict in black market cases in a midwestern city was shot, and the next day retail dealers all over that city sold to the highest bidder.

The death of the president seemed to give a certain class of society the idea. The death of the judge seemed to crystallize the idea. In the two weeks following the president's death twenty-six judges and federal men were slain.

The squatters league formed in Chicago and immediately spread to other large cities. Organized bands moved into vacant

houses and apartments and defied the authorities to oust them.

Unions defied authority completely, without a president in the White House.

Thousands of sex maniacs and petty criminals ran amok. Police forces were inadequate.

A temporary president was appointed from the Cabinet to serve until one could be elected.

On May first the unions began to enforce the use of fight cards. Thousands went into unions to keep from starving, but other thousands took to organized robbery, religiously leaving money to pay for what they took.

The temporary president was helpless and finally was forced to put several of the larger cities under martial law, and operate almost two thirds of the nation's factories under military control.

Finally, on July twenty-fifth, he resigned his office. The next day the army declared martial law. July 26, 1948! This story has been told before—of how the army arrested union leaders and took over their bank accounts and books. Of how the army, with its thousands of disgusted G.I.s shot over three hundred men in three weeks before resistance to martial law ended. And of how the national economy slowly but surely was restored under the sane decisions of men with the strength to enforce their will on the renegades in black markets and small monopolies all over the country.

But the story has not been told of the silent drama going on underneath the people's feet, as the atom-powered mammoths of sub America moved irresistably here and there, carving out passages ever deeper.

The cubic miles of crushed rock taken out were being dropped into the many chasms discovered along the way, and hoards of geologists and mineralogists and engineers were studying the structure of the rock through which the machines bored their shafts.

PLANs for the new Capitol southwest of Chicago to house the surface and the sub-surface governments had been laid before the president's death. It was planned eventually to cut off the sub-surface group entirely from all contact with the surface as soon as it became self-supporting, but until that time it would be wise to have both sections of humanity controlled from

a central point, Washington, D. C., was too far to the east for practical purposes.

The army welcomed the excuse for dictatorship, as it ensured greater safety through partial censorship of the press, and made it possible to eliminate individuals who threatened the secrecy of the project.

The president had objected to dictatorship as being fraught with too many potential evils. Yet he had dreaded the possibility of his defeat in the next elections and the possibility of a man coming into office who would reverse his decisions and possibly decide to reveal the whole thing to the public. Stalin had urged a military coup directed by the president. The British had urged sterner government to end the unrest and inflationary tendencies in the United States.

In the end things had worked out this way anyway, because they had to. There was no other way. Stories of races facing impending doom, and voluntarily ending their existence by the humane method of not having children are all very well—in fiction. Or if the entire race is doomed. But when a part of the race can be saved, too small a percentage would voluntarily choose extinction of their line in favor of others, and it would be those who chose extinction who should be saved, because they would have the highest qualifications which should be preserved in the surviving remnant in order to give the future generations a heritage of true civilization.

True civilization is not made of machines and technologies, although it may be dependent on them for its very existence. True civilization is made of ideologies and philosophies and senses of values. It is based on respect for the dignity and rights of the individual, coupled with a mass responsibility for his welfare. It is based also, and equally, on the respect of the individual for the rights and dignity of the masses, the community and the government, coupled with individual responsibility for its welfare.

A country in which a senile, selfish house owner can demand the four years savings of a man who fought to preserve his safety as his rightful profit is not civilized.

CHAPTER VIII

JERRY climbed into the waiting taxi and sat back in the comfortable upholstery

with a sigh of satisfaction. It had been many months since he had left Seattle.

First he had gone to Hanford to help with the designs of the atom motor for the borer. When the first one had been completed he had gone with it to Chicago and supervised its installation in the test model. From then on he had been in the field, watching the performance of the atom motors and suggesting improvements and refinements in design.

This had been most important, for the motor had to be so designed that no neutrons or radioactives could filter past the shields and contaminate the bores.

The work of improvement had gone on at Hanford, the main research being concentrated on more efficient shields and better neutron barriers. Such progress had been made that the atom motor had been reduced in weight from several tons to the weight of a diesel with the same horsepower.

Alloying of the radioactives had resulted in almost perfect consumption of neutrons, and the escaping alpha particles in the motor were stored in a pressure tank as helium.

But extreme care had to be taken at all times, for the escape of large amounts of neutrons would begin the fatal, endless, reversible reaction of neutrons and hydrogen, and neutrons and elements which resulted in more and more neutrons, until eventually the slowly growing reaction would become strong enough to destroy life, as it was doing on the surface.

The events of the winter on the surface, the death of the president, and the change in government, had had only a mild effect on him, as he carried on his absorbing task "down under" and gazed with wonder at the sights uncovered by the machines.

Now Jerry was taking a well-earned vacation. He opened the paper he had bought just before entering the cab. The date on it was September 7, 1948.

The front page was much different than it had been a year before. Then it had been full of strikes, war scare, meat shortage, and hysteria. Now it was what would have been called ultra conservative then.

Crime news was banned, although news of divorces, law suits, fires, accidents, and almost every other thing except crime was just as freely discussed as ever.

Crime statistics had proven that publication of crime news and the importance it

had held in the newspapers had been a major factor in encouragement of crime.

Strangely enough most of the news concerned the doings of various religious leaders.

But Jerry was not interested in what was going on the surface. To him the surface was a foreign country, whose only interesting inhabitants were Catherine, Olly, and Alex.

He folded the paper and watched the passing scenery. Seattle had changed not at all during the past year. There were few old cars on the streets and lots of new ones. The taxi he was riding in was a '48 Dodge. And aside from the fact that all policemen were army men, the country looked and acted like the good old U.S.A. of the thirties and twenties.

The cab passed over the university bridge and turned right toward University Way. There it turned left and went through the business district, and on to fifty-third, where Olly still kept the old apartment and his laboratory in the back of a street level store.

Jerry had not been permitted to wire ahead that he was coming, nor would he be allowed to say much of anything about his work. Correspondence with his brother and with Catherine had been difficult because he could not say anything about his surroundings or his work. The only things he could write about were comments on what was written him.

THE cab drew to a stop in front of the old, familiar door that opened onto the stairs to the upstairs apartment. Jerry got out and looked for change to pay his fare while the driver retrieved his bags from the trunk compartment and placed them on the sidewalk.

Then he unlocked the door and held it open with his foot while he picked up his bags.

Olly wasn't home, but the apartment looked the same as always. Olly's book lay on the desk in the living room. It looked nice with its dark green back and the embossed title in gold. **NATURE AND ORIGIN OF LIFE.** And under it in smaller letters, Oliver E. Chadwick.

Jerry recalled Olly's last letter in which he had hinted at something big. His words had been:

"When you get home I have something

REALLY important to show you. A surprise that will thrill you as much as it did me."

Jerry looked around curiously, hoping he would see something different that might be this big surprise, but everything was the same as it had always been. Even the waste basket seemed to be the same, and have the same papers in it as it had had in the Fall.

The sound of the street door opening came up the stairs. A rapid clatter of feet followed. Jerry listened for the sound of Olly's dragging footsteps to follow those of the first. Then Olly was standing in the doorway, a look of surprise and delight on his face, his figure upright and straight.

"Jerry!" Olly exclaimed. "When did you get here? Why didn't you let me know you were coming so I could meet you?"

"Olly, you old son of a gun!" Jerry said. "So this is the surprise! You—you're all right now!"

"Yes," Olly answered. "That's the surprise I told you about. Nerve grafting made such advances since last year that it was possible to have an operation to correct my paralysis. It happened only two months ago."

"Darn it," Jerry exclaimed, tears in his eyes. "Gee I'm glad it was possible. Now you can play tennis again. How about a game this afternoon?"

"Well," Olly said with a sly grin. "If you can get Catherine to come along we might make it a foursome."

"Don't tell me!" Jerry laughed. "Olly, the old hermit finally has a girl. Or are you running around with one of your rabbits from the lab?"

"No, it's a mouse," Olly smiled. "And what a mouse!" He looked thoughtful, then added seriously, "You know, when I was all wrapped up in pity for myself I was blind to the fact that there might be someone who cared for me. And all the time that teacher who helped me so much in my notes, who I thought was the intellectual type, and only interested in my work, was really interested in me. It didn't dawn on me until after the operation."

"You mean Betty—" Jerry snapped his fingers in an effort to recall.

"Yes," Olly said. "Betty Tryon."

"Just a minute while I call Catherine," Jerry said. He rapidly dialed her number.

Her exclamations of delight at the sound

of his voice could be heard across the room from the phone by Olly, who grinned appreciatively.

"She's coming over," Jerry said when he finally hung up.

It seemed only a moment later that her rapid footsteps came on the stairs and she ran into the room. In the doorway she paused, then walked forward casually, a twinkle in her eye.

Pretending to notice Jerry, she said in mock surprise.

"Oh, hello, Jerry. Have you been away? I've missed you lately."

"No," Jerry replied, looking thoughtful. "I guess I've just been out when you were over. I've been rather busy the past few months."

Then they were in each other's arms, and she was mussing his hair and kissing him alternately, and making up for all the lost months during which she had missed him.

"How's Alex?" Jerry finally asked.

"He hasn't been feeling too well," Catherine replied with a worried frown. "His heart is getting weaker, and he has to watch himself more and more or he gets too tired."

"I want to see him," Jerry said. "Suppose you drive me over to the campus and drop me off. By the way, will you help me beat Olly and Betty at tennis this afternoon, Cathy?"

"I shore will," she answered in a hill-billy voice.

"What time were you and Betty going to play?" Jerry asked Olly.

"At three o'clock. That okay with you two?"

"Okay by me," Catherine replied. Jerry nodded his acceptance, and the two went down the stairs, hand in hand.

SEVERAL new buildings that had been under construction on the campus in the Fall were now finished. Jerry looked at them approvingly.

School would open in another three weeks, and already there were many students on the campus, as Catherine drove the car along the drive that circled the library, parking it just behind in a space reserved for faculty members.

"I'll wait here," she said.

"Okay," Jerry replied. "But I don't know how long I'll be. Your father and I have a lot to talk about."

"That's all right," Catherine replied. "I've a book with me that I can read."

Jerry cut across the lawn to Physics Hall and took the steps two at a time to the second floor where Alex had his office.

When he opened the door Dr. Topanov was sitting at his desk poring over his ever-present scratch sheets covered with equations. He did not look up until Jerry spoke. Then he rose hastily, an expression of intense pleasure on his face.

"Jerry, my boy," he exclaimed. "When did you get back?"

"Just now," Jerry answered. "What's this I hear about your heart going bad on you?"

"Oh, it's nothing," Alex shrugged his shoulders as though brushing off a minor irritation. "Tell me, how has the work been going? They tell me you have done a wonderful job in suggesting improvements on the boring machine and the system of disposal of rock."

Jerry blushed self consciously.

"I haven't done any more than anyone else in my place could have done," he replied. "But it's been interesting work. Under the surface is a whole new world. We've uncovered mysteries that probably never will be explained satisfactorily."

"What kind of mysteries could they be, to have no explanation?" Alex asked.

"Well," Jerry began. "In one place we've opened up a cavern with a level floor and high ceiling. The floor area is almost a sixteenth of a square mile. The walls and floor are solid granite, very hard and without a single crack big enough to slip a thin knife into. No openings except the one we made ourselves in the solid rock. And it's eight thousand feet under the surface.

"In that cavern are skeletons of men and animals. At least we assume they are men and animals. The peculiar thing is that when put together they are the bones of men from the waist up and of some extinct species of goat from the waist down! Improbable as that seems, the upper leg bones fit into the hip sockets as though they had been there originally.

"There are ten of these skeletons. The bones are all there, although they were scattered around and mixed up, somewhat like they would be if they had been collected indiscriminately and then strewn around.

"How did they get there? That's the

biggest mystery. The only possible explanation is that somewhere in the walls of that cavern is a sealed entrance that is carefully hidden. If so, we haven't found it yet.

"And are these bones the skeletons of some half-human species of creatures, or really a collection of human torso skeletons and goat leg bones? What makes that part more interesting is that the skulls of the humans have a brain case larger than any other on record. Not only that, on two of them the bony structure above the temples indicates that they had horns of some kind, although there were no horns present."

"Hm," Alex said thoughtfully. "At what age do the geologists place the formation where they were found?"

"No age can be placed on it," Jerry said. "By that I mean that the cavern is in the heart of a huge solid formation which has undoubtedly remained much as it is today since the earth first cooled. There aren't any signs of tools being used to cut into the walls and floor of the cavern, yet it could not possibly have formed in the shape it is naturally, with an almost polished floor, perfectly level right up to the walls. It looks like it might have been a huge, rough cavern which had been partly filled with water, and the water frozen and then turned into the same kind of rock as the walls."

"Very peculiar," Alex admitted. "I'd like to visit this place sometime. What are the other mysteries that have been uncovered?"

"THIS is the most unbelievable one of all," Jerry began. "In the same formation, but about fifty miles from the first, there was the same kind of a cavern, only smaller and with rooms. No openings from it of any kind. And in one of the rooms—there were six, in all—was found some kind of an electrical machine.

"At least we assume it's an electrical machine. It has coils of silver wire, but no signs of insulation on them. Any insulation of a resin or cloth variety would have vanished completely anyway after a few thousand years.

"Also there are things that must have been some kind of metal-cased vacuum tubes at one time. And here we had a chance to estimate the age of the thing."

"How's that?" asked Alex.

"Different metals were clamped together. In several thousand years the molecules of each would creep into the other. When they are of different metals this creep can be determined, and by comparing it with the creep in metals from the ancient tombs of the Pharaohs and other data we have, it is estimated that the machine is over three million years old!"

"What is the machine supposed to do?" asked Alex. "Of course you and the other technicians didn't rest until you had examined it in detail and deduced its principle."

"As nearly as we have been able to make out so far," Jerry said, a note of exasperation in his voice, "the thing has no principle and can't do anything. We've even built a duplicate with insulation where it is supposed to be, and tubes specially built to duplicate the old ones, and nothing happens."

"Well, surely," Alex objected, "if it has coils and wires and vacuum tubes it has a circuit, and the elements of the circuit should give some hint of its purpose!"

"You would think so," Jerry said. "But the natural deductions from the circuit don't make sense. The motif seems to be opposing magnetic fields. There are dozens of small coils wired together and placed so that two electrically produced magnetic poles are together. These are in banks, so that they make plane disks of thin but intense magnetic opposition. The planes are about a thousandth of an inch thick and a foot in diameter."

"How are these magnetic planes placed relative to one another?" asked Alex.

"There doesn't seem to be any sensible relation among them," Jerry said. "That's the trouble. We have a machine that took at least intelligence to build, which has no discernible function except to make magnetic planes in circuits affected by vacuum tubes very much like our own radio tubes in construction, and the machine is found in a cavity in the heart of solid bed rock where anyone would have to pass through at least half a mile of solid, unbroken rock in any direction to get in or out. It would suggest fourth dimension travel if that weren't absurd."

"Perhaps so," Alex said thoughtfully. "Sometimes I wonder. There is a whole book of things which, on the face of it, are

absurd and unexplainable. That's Fort's book, you know. And now it seems the unexplainable extends even into the Earth's crust. What else have you found?"

"Oh, lots of things. Too many to tell them all now; but I'll have a couple of weeks before I have to go back," Jerry said. "Tell me, Alex, How has your work gone?"

"It seems as hopeless as ever," Alex answered, his shoulders sagging at the return of the despair he always felt now at the realization of what was in store for the world.

"Tell me about it," Jerry suggested.

"All I can say that you don't already know is that there is nothing new to tell," Alex replied.

"Tell me anyway," Jerry asked. "Just to refresh my mind."

"Well, all right," Alex gave in.

AS YOU know, the concept of critical mass led to the atom bomb. In the materials of the atom bomb we have an atom disrupting due to a strike by a neutron, releasing more than one neutron in the disruption. That makes additional neutrons which can disrupt other atoms in the lump. But if the lump is small most of these neutrons escape into the atmosphere, so that there is no rapid consumption of the atoms in the mass. That is where we overlooked things."

"I know," Jerry replied. "We just simply neglected to examine carefully ALL the things that happen to the neutrons that escape. The atmosphere is certainly a critical mass for anything. If any kind of chain reaction could be carried on in it by the simple turning loose of a critical amount of neutrons it would with certainty, and it IS. *We just assumed that the escape of a neutron put it beyond any need of attention.*"

"As you know," Alex went on, "The neutrons and radio-active atoms left over after the explosion of the atom bomb immediately began a secondary phase of activity like the first chain reaction of the bomb, only almost imperceptibly slow. Some of the chain reactions ended with the production of alpha particles, which ended the chain, for all practical purposes; but some of them ended with more neutrons than they started with, and some ended with the same number, but emission of hard radiation, such as is the case with the reversible chain re-

action of hydrogen, which produces neutrons, deuterons, protons, and their corresponding atoms.

"In theory I could figure out the atmospheric composition that would end the process by cutting down the rate of production of neutrons in the various chains set up by the explosions of the bombs. There is no possible change in atmospheric content that could do this without the introduction of inconceivable amounts of finely divided solids, in almost atomic dusts, which would absorb the neutron production and convert it to alpha particle production.

"The most efficient system I have figured out yet would necessitate the spreading of fifteen million tons daily of atomic dusts in the stratosphere for over a century, of kinds that are either not available in sufficient quantities or are poisonous to vegetation in the amounts that would settle to the surface.

"It's simply beyond the ability of Man to stop the chain reaction in the atmosphere, and especially the stratosphere, that was started by the explosions of those five —no, six bombs, with the Russian one."

"And," Jerry completed the discourse, "in three centuries the atmospheric temperature induced by this radio-activity will reach a hundred and fifty-five degrees Fahrenheit, the hard radiation striking the surface will become lethal, and there will be a perpetual blanket of steam in the upper atmosphere that will completely hide the surface of our planet just as it does Venus."

"One thing I've re-examined very carefully," Alex added. "There were always neutrons in the atmosphere. Why hasn't this reaction begun long ago? I have the data on that now. It's the critical density of neutrons. Below this critical density more alpha particles result. At this density exactly the same number of neutrons and alpha particles result, so that the reaction remains stationary. Above the critical density more neutrons result than alpha particles, so that the radio-activity of the atmosphere increase more and more rapidly, until the substance of the atmosphere changes into alpha particle-producing atoms, when it dies down again.

"One atom bomb wouldn't do the damage. Two might. Four or five certainly would, so that my original work on the

problem still stands. There is no loop-hole."

"Well," Jerry said with a sigh, "Catherine is waiting outside in the car. Are you ready to go to lunch, Alex?"

"I guess so," Alex replied, taking his hat off the old fashioned hat tree by the door. He paused before opening the door and turned around to look at Jerry. Then he said, "If there were some way to increase the percentage of carbon dioxide in the atmosphere to better than sixty percent for a while we could end this menace. But burning all the estimated coal deposits and all the vegetation on earth wouldn't produce enough."

The two walked wordlessly down the hall and to the car. Alex's breathing was audible and slightly wheezing as he climbed wearily into the front seat beside Catherine.

THE housekeeper opened the front door as the three walked up the front steps of the Topanov house. She was smiling broadly, and her table, already set, expressed her glad welcome of Jerry with its assortments of steaming foods.

During the lunch she bustled around, worrying over Alex, insisting that Jerry eat more, and otherwise showing that her eternal threat to quit unless things were done to suit her schedule was just a bluff, and always had been.

In the middle of the meal, during a long silence, Jerry started to chuckle.

"I just remembered my general handy man," he said by way of explanation. "He's a big, husky moron. His name fits him, too. It's Orvis. Orvis Oshiboski. He's a typical Hollywood conception of the dumb gangster type. But he's certainly likeable. I have no end of fun with him, because he always takes everything so seriously."

"He's from Spokane, and he got his leave for the same time I did. He has one of those flat faces, with a broken nose bent over so that it accentuates the flatness of his face, making it look like it had been placed against a flat board and kept there while it grew."

He chuckled again to himself. "I wonder what Orvis is doing now?" he went on. "Probably basking in the pride of his wife and kids. I'll bet he's sitting in an easy chair and his wife is bringing him his

slippers and fluttering around, fetching newspapers, coffee, and smokes."

Jerry glanced slyly at Catherine who returned his glance with a look that told him she would like to be doing that, too.

CHAPTER IX

ORVIS was not at home basking in the lap of luxury. He was closeted with Billy Nugent, his old high school chum and fellow spy.

Billy was at the typewriter, and Orvis was telling everything he could remember of what had happened for the past few months. The pile of typewritten sheets beside the typewriter was growing as Orvis talked.

From the railway depot he had gone straight to Billy. After a short talk Billy had told him to go home and get some sleep and meet him in the morning. So now, Orvis had been talking for six hours, while Billy typed it all down.

At last they finished.

"What good is all this going to do now?" Orvis asked. "The democracy is ended and the army runs everything. What can the big shot in Washington, D. C. do about it? Nothing."

"Just the same," Billy answered, "He's willing to pay for the information, and maybe he *can* do something. If he can expose this whole thing to the public the people might revolt and throw out the army."

"I'll bet he gets shot instead," Orvis said gloomily. "I wish I wasn't in on this."

"Even if he did," Billy answered, "you wouldn't get mixed up in it because he doesn't carry your name in his files."

JOHNNY DAVIS' face held an expression of bafflement as he turned the pages of the report Billy, in Spokane, had sent him. His keen brain was trying to co-ordinate what they contained with all the things he knew. More and more things weren't making sense.

And more and more he was learning things he didn't dare broadcast. Finally he laid the report down and picked up a scratch pad. He wrote some questions on it.

Why are they boring all over the country and not just under the cities?

Why don't they inform the public of

the findings of strange relics under the surface?

Why are the bores down so deep, except under the cities where there are extensive bores that will serve adequately as bomb shelters, all completed with living quarters for millions of people?

Why are there carefully concealed passages from the upper to the lower levels of the bores—like the lower ones might eventually be sealed off permanently? He was thinking of Orvis' description of a heavy stone door that would drop in place in such a way that it would look like part of the wall.

Could it be . . . ? No. He shook his head. The idea was too utterly fantastic. Or was it? He wrote the question at the bottom of the sheet:

Could there be some impending happening that would destroy life on the surface? If so, what could it be?

The question intrigued him. It would explain a lot of things. But there were also a lot of things it wouldn't explain. Why the secrecy? If the world were threatened by something that would make life impossible wouldn't it make life impossible in caves, too?

Maybe astronomers had sighted some comet headed toward the earth, whose tail contained poisonous gases that would kill off all life. Suppose it were predicted to strike in five or ten years. In that time caves to accommodate the whole population would be impossible to build, but enough to save part of the population could be hurried through in that time.

But, if that were so, who would have the say as to who would be saved from destruction?

Johnny picked up the phone and dialed a number. After a short wait he spoke.

"Hello. Professor Harding? This is Johnny Davis. Could you tell me if any comet or other body is going to strike the earth sometime in the near future—say about two to ten years from now? Not that you know of? Well say, would it be possible for a comet to hit the earth and poison the atmosphere to such an extent that it would destroy life? It wouldn't? Oh, I see. Its tail is too tenuous. Thank you."

Johnny hung up. Now he was more puzzled than ever. The only threat that could come from the heavens was total

destruction of the Earth, in which case caves wouldn't do much good.

The idea would be utterly screwy except for one thing. Why did the government ask the same question of all new recruits into the armed forces and into the labor battalions? Questions that dwelt on one theme—what you would do if you had to kill somebody in order to save someone else?

WHEN the army had declared martial law for the nation it had put censorship on all newspapers and periodicals with the exception of properly incorporated clubs and their official bulletins, provided that their bulletins were not sold publicly.

Johnny had promptly formed the Scoop Reporters Guild, with at least three national scoops to your credit before you become eligible for membership. There were associate memberships to take care of the rest of his secret organization.

If he found some gigantic deception going on he could quite easily spread the news all over the nation by whispering campaigns. If there was catastrophe coming the people should know about it and have an equal chance to save themselves—not just some chosen clique.

In case of a real emergency he could always send the news out over his regular newscast. Radio reporters were permitted to send without enforced censorship until they violated the long list of rules put out by the government, after which violation they were muzzled. Johnny had been very careful. Mainly because he preferred the army rule to the state of things it had supplanted.

A memory forced itself into Johnny's mind. He had been standing in the outer office. Doctor Topanov's voice had come through from the president's office, saying:

"What I have to say to you, Mr. President, should be said to you alone at this time."

"And Dr. Topanov is the world's top atom scientist," Johnny Davis said quietly to himself. "So that's it!" Rapidly he thought over in his mind the men he might pose this problem to, discarding them one after another. The government musn't learn what he was thinking. If he were on the right track they would put an end not only to his investigation but to his life, to preserve the secret.

If he could find the proof someplace himself and inform the public, they certainly couldn't kill everybody to keep the secret!

Half an hour later he was looking over the shelves of the physics section in the public library. He knew what he was looking for. It would be something about radio-actives that could threaten the world. It must be connected with the explosion of atom bombs, the Russian bomb notwithstanding.

Finally he found what he was looking for in a book on atomic physics. He copied down what he thought essential.

"About 150 nuclear reactions have been studied and we shall now examine some general features of transmutation processes. In general the process is of the type:

NUCLEUS plus BOMBARDING PARTICLE yields NEW NUCLEUS plus ONE OR MORE PARTICLES OF LOW ATOMIC WEIGHT plus KINETIC ENERGY.

"The phrase, 'particle of low atomic weight' implies a proton, a neutron, or an alpha particle. The disintegration may also be accompanied by emission of gamma rays."

Johnny whistled in amazement. A glimmering of the truth was seeping in. Disintegration might be like a slow, atomic fire. The production of more particles of low atomic weight than went into the process would imply that the process would increase—like a small flame in a pile of wood on a fire. All the elements of the atmosphere were subject to this radio-activity. And the atmosphere was so great that the bombarding particles could not escape like they could in U-235 when it was smaller than the critical mass.

"So that's it," Johnny muttered to himself. "Undoubtedly Topanov figured out rates, based on the volume of atmosphere and found out how long it would be before this 'fire' reaches lethal proportions. Obviously that is what must be happening, or they wouldn't be building such elaborate underground caverns."

"Maybe there's something about critical volume of atmosphere," he went on with the thought. "Whatever the details, there must be a short period of safety left or they would be in more of a hurry."

Johnny left the library with the light of battle in his eyes. At last he had something to go on. In his mind thousands

of facts were clicking into place. They added up to a picture that he felt sure was true, because no other common denominator could account for them.

He must handle it carefully, he was thinking to himself as he drove back to the office. A simple scoop over the radio might be ineffectual. The government would muzzle him and issue a denial. People would do nothing. He must convince as many people—especially leaders in various organizations—as possible before the army discovered he knew their secret. Then even though they kill him the work he had started couldn't be undone. The public would know the works!

JOHNNY had not noticed the quiet, studious fellow that had been browsing among the books in the physics section while he was there. The fellow had been just part of the atmosphere of the library, to him, and so the secret service man had been able to see all the things Johnny looked up, and watch the expression on Johnny's face.

In his car as he followed Johnny later, he called his headquarters and reported that Johnny now knew the secret. They had known he would find out sooner or later. The secret service had traced the microphones in Chadwick's apartment and watched the men who had gathered the records. They had followed the records in the mails to Johnny's office in Washington.

Since then they had kept him under constant watch, and periodically gone through his files during the night, so that this moment would not arrive unnoticed.

Now it was time to act. What form the action would take would depend on Johnny Davis. For several months his broadcasts had been through delayed transcriptions, unknown to anyone except the operator of the radio station and the government man on duty while Johnny was on the air.

It went like this: Johnny would speak into the mike and his voice would go onto a recording tape. This tape would broadcast the voice ten seconds after it came from the mike. At the same time a loud speaker told what Johnny was saying, so that if he had managed to discover the secret and broadcast it without warning his voice could be cut off the air while he was talking, and before he could get

any significant hints broadcast. That was the purpose of the ten second lag, which was short enough to go unnoticed, and long enough to take care of the first few words he might speak before the censor would realize what he was saying.

JOHNNY brought his car to a stop at a red light. The door of the sedan behind him opened and a man in a light gray suit stepped out. Just as the light changed to green the right hand door to Johnny's car opened and the man in the gray suit climbed in.

He was holding a badge in his hand where Johnny could see it plainly, so Johnny slipped the car into gear and said nothing to his visitor.

Through the rear view mirror Johnny could see the sedan still following, with three men in it. He took his eyes off the traffic long enough to size up the man beside him and ask:

"What's this all about?"

"Turn right at the next street," the man said by way of answer.

Johnny's mind thought over and discarded plans to escape. If he ran he might get away for a time, but without the organization which centered from his office he would be helpless to spread the news he had uncovered.

So he shrugged his shoulders in resignation and followed directions.

Fifteen minutes later he was seated before three men in uniform. They looked and acted like judges. One of them was talking.

"We brought you here," he was saying, "Because our field man saw that you had uncovered the big secret. It's useless for us to try to convince you your conclusions are wrong, so we'll start on the admission that they are right.

"But we want you to know the whole story," he continued slowly. "Then you may see why it IS a secret, and why you must keep it with us.

"In three hundred years the radio-activity in the atmosphere will increase to such proportions that no life on the surface will be possible. It will remain that way for two thousand years. After that time it will again be possible to return to the surface and go on where we left off.

"As you can see, this does not affect the present generation, or even the next couple,

to any appreciable degree. And even with atom-powered earth borers we can't carve enough space under the earth to house the entire population of the world. So only part of the race can be saved.

"That's why we have to keep it secret. If it were made public the economic structure would collapse, and there would be struggles to see who would be the lucky ones who would be able to preserve their line. Fundamentally we are only concerned with saving the races of man, along with as many life forms upon which we are dependent as possible. It isn't quite the same as if our own lives were at stake. All of us will be dead long before disaster strikes."

"But naturally," Johnny said bitingly, "Your own children will be among the favored few who will find refuge while the people are left to face their fate unspectingly."

"Perhaps," the speaker replied. "What difference does it make whose it will be?"

"You have set yourselves up as gods to decide the destiny of the race!" Johnny said accusingly. "Why don't you put it up to the people?"

"You know what would happen," the spokesman answered patiently. "We would get misfits if it were left up to the public. We must select those who are civilized enough to live together in harmony, and educated enough to take their place in the work of survival. At first they will have the worst of it. They will have to remain underground permanently while the rest of mankind lives in freedom under the sun. They must be intelligent enough to realize they must stay there. In another fifty years a leave spent on the surface would contaminate their flesh too much to allow them to come back."

"Well, then," Johnny exclaimed, "Announce the thing to the world and let everyone take part in it. Then those who can't go below can exercise birth control to end the surface race."

"Which ones will volunteer to stay on top and exercise the birth control?" the spokesman said bitingly. "And how will you convince the millions who can't read, and the millions who would shove their mother aside to escape from a burning building, that they should have no children because in eight generations life will suffer agonies of radio-active burns?"

"I can see your point," Johnny conceded, "But I still say the public should have the say as to what will be done. They should be allowed to choose the method of selection and who is to enforce it, military dictatorship or not."

ONE of the other of the three army men spoke up.

"You could help us a lot, Mr. Davis. Your program wields a lot of power over the public, and you have used that power carefully so that it has increased rather than waned during the changeover to army rule. Would you give us your word not to divulge what you know until you have had time to weigh the arguments pro and con?"

"And if I won't?" Johnny asked, his voice soft and dangerous.

"It would be too bad," the officer said slowly.

"I think I'll call that bluff," Johnny said. "I don't think you would dare lock me up. If you did it would advertise that freedom of the press is gone for good. Even if the people never found out why I was put out of the way they would imagine reasons just as bad, and act on them."

He glared at the three men for a moment, waiting for an answer. When none came he turned on his heel and walked out. With each step he expected to feel a hand on his shoulder, and the words telling him he was under arrest. But he reached the street door unmolested, crossed the sidewalk to his car, and climbed in.

Two blocks away a man stood on the street corner watching. His eyes followed every inch of the progress of Johnny's car. Finally, when Johnny was still half a block away he took off his hat and scratched his head.

Half a block down the side street a heavy sedan that was double parked burst into life. Its motor roared, and it started up with a terrific burst of speed.

Johnny was over half way across the intersection when the sedan, going about fifty miles an hour, swerved and struck his car right at the driver's seat.

The man on the sidewalk stood still, looking at the scene of the crash with an expressionless face. The driver of the sedan climbed out and looked in at Johnny's crumpled form. Then he stepped back.

His eye caught that of the man on the sidewalk. He nodded once. Grimly.

The man on the sidewalk turned and walked up the way Johnny had come. The "accident" routine had been used before. It would be used again. And again and again.

Was it right? The man shrugged his shoulders fatalistically. Perhaps there was some other way. But it was not for him to decide. His job was to follow orders. And logic says it is better to kill one innocent man to save many than to let him live so that later the many will die.

The fact is, such logic depends on a judgment that if the man lives the many will die, and if the premise is false the conclusion is criminal.

Only by actually letting the public know the truth could it be determined whether it would be wise to let the public know. And if it weren't wise there could be no recall of the error. It would be impossible to blot from the memory of the millions the knowledge of the doom coming to life on the surface. Perhaps it would prove impossible to keep it from them in the long run anyway.

CHAPTER X

JERRY stepped out of the "taxi" and through the doorway into the large lobby of the officers' "hotel." Its location was designated on the maps as "Hdqtrs. Sec. K; Level H; Zone G."

This meant that it was seven thousand feet below sea level and a mile and a half directly south of St. Louis.

His leave was over, and for the next four months he would be busy doing his job in this gigantic project of carving out living space for a nation under the surface.

Aside from the fact that there were no windows the hotel was very little different from one on the surface. The lobby floor was of polished tile in various colors. There was an elevator bank along one wall that would take one to any of the seventy "floors." The hotel had ten thousand rooms and a bath for each room.

The plumbing was of copper tubing, and the sewage pipes led to a sewage disposal plant a mile or so away, where the solids were salvaged for use in the hydroponics gardens now under construction, and the water, after multiple distillation, was re-

turned to the storage tanks.

Section K was the same as each of the other completed sections of the underground world; designed to be a self-supporting unit, housing a hundred thousand people and with enough vegetation to convert the carbon dioxide to oxygen, the vegetation providing food for the people and for the meat animals that would be needed.

Jerry had nothing to do with that phase of the work, however. His present job was to supervise the laying out of the subsection power plants. Their construction was a delicate, dangerous proposition. Boring machines carved huge tubes directly toward the center of the earth, going down until the temperature was high enough to produce high-temperature steam.

This could only be done where the rock formation remained solid clear to the core. Seismic probings didn't always show the true construction below, and several boring machines had been lost before they could complete their work, and the holes had had to be filled up.

But already three power plants were complete and in operation. After completion, the bores were plugged, with huge pipes leading from the plugs to the turbo-electric power plants. Then water was admitted to the bore, to drop the thousands of feet to the level where steam would be generated.

Too much water would mean too much steam generated and then the plugs would blow, sending a gale of live steam throughout the underground world and burning all in its path.

The time lag from the admission of water to the buildup of steam pressure was very great, so that great care had to be exercised.

In the other direction, upward cooling pipes were imbedded in the rock, going up to just a few thousand feet below the surface. An interlocking valve system had been devised so that the water in the cooling system could go clear to the top without the tremendous pressure that would otherwise exist at the bottom of the pipes being produced. These were automatic, and worked themselves without power because of the difference in weight between hot and cold water.

The whole power system was automatic, requiring only supervising engineers to see that it stayed in operating order.

Each section would be built so that it would be much like a balanced aquarium, needing no replenishing in moisture, air, or vegetation.

As soon as one section was completed and manned by a skeleton personnel it was closed off from the construction areas around it.

Everything was systematized into unchangeable routine. There were now three thousand boring machines on the job, and several new ones being assembled each day.

Underneath Chicago had been built the gigantic factory section, where already most of the parts of the boring machines were being made independent of the surface factories.

The incredibly tough cutting tools that made up the forward jaws of the boring machines were the first part to be made in the new factory section. There were alloyed by an infiltration process after they were formed from a tough steel alloy. When completed they could chew out the hardest of rock for days with no sign of wear.

IN THE ten months since the first boring machine had poked its nose downward and started its slow, deliberate advance through solid rock, all this had been done. In ten years the job would be complete in its more essential outlines.

Then there would be room in the underground world for several million people.

A similar job was being done in Europe, Africa, Asia, South America, and Australia. In all, it was estimated that there would be living room for about two hundred million people where they could be safe for the two thousand years they would have to remain underground. Perhaps in that time they would not want to go back up.

There would be libraries, schools, gardens, and leisure to live a fruitful life of study and mental development in the caverns underneath the rough surface. Above there would be only hardship and work.

But that was a problem for the future, not the present. The present job was to make a place for as many people as the sub-surface would permit, divorce them from surface life completely, and see that they were started in a peaceful, stable way

of living that would ensure the preservation of the race indefinitely.

THERE were many problems involved in this work. Cavern cities could not be built where the earth would be constantly shifting for thousands of feet down, because there would be continual breaks in the tunnels.

Potential sections under which the formation would not allow the construction of a power house could only be used for stock piles, not people.

In some sections the temperature gradient was too steep for safe construction, and in others the nature of the rock was too fluid for safe structure.

In the sections where construction was safe the engineers had to exercise great care in judging how much space could be hollowed out without endangering the works. Stress patterns in the rock could be mapped with ever increasing accuracy, as experience with them grew.

When a new section was started by the borers they made several test alleys, as they were called, clear through the section. From the walls of these test alleys the mapping of the stress patterns of the section could be made. Then the boring procedure could be mapped out and the boring done with relative security from mishap.

Much of the work had been shortened by the discovery of huge natural caverns in which living room could be built without the time killing work of carving.

Other caverns had come to light so that the cubic miles of material carved out did not have to be dumped at the surface.

The finest brains the country had were on the gigantic project, mapping each step of the way, foreseeing every possible contingency and allowing for it. The old industrial practice of the suggestion box for the workers also did much to increase the efficiency of things.

One laborer who had only a grade school education and no particular aptitude in any ordinary line proved to be a genius at figuring out synchronizing details. He it was who suggested the double barrier behind the borer, by means of which the boring machine with its atom motor would be always sealed off from the rest of the works, and yet allow the continual string of cars carrying the loose rock to travel uninterruptedly.

He had also designed the interlocking valve for the cooling system that permitted free circulation of water to any depth without buildup of pressure. With this second achievement to his credit he had emerged as a person. The name of Steve Jensen went into the books as an outstanding figure in the building of the caverns.

Problem after problem in synchronization and coordination of all branches of effort was seen by him and solved, where it was not even seen by other men.

There were other men whose names became legendary in the history of the tunnel building. And among the most outstanding was Jerry's. Jerry had not been content with just his original assignment to supervise the operation of the atom motors.

He had redesigned the entire boring machine. The first ones had made a smooth bore, and moved along it with caterpillar treads pressed to the top, sides, and bottom of the shaft. Jerry had noticed a certain amount of slipping. He had incorporated a rifling action into the cutting, and replaced the caterpillar treads with a worm that used the rifling, eliminating the slippage.

He had made the first bold plans to utilize the earth's heat to run the power plants, eliminating the danger of the original plan to use atom power.

He had studied the other branches of science brought into play in the construction of the bores. His omnivorous curiosity had made him part of every phase of activity.

AS JERRY stepped into the lobby of the hotel his mind was far away. He was thinking of Catherine and Alex, and of Olly. The last thing he had done before leaving the surface had been to put in a request for them to be allowed to come down. If not to stay, then at least for a short visit.

Orvis rose from a chair he had been half asleep in and came forward to meet him.

"Gee, Jerry," he exclaimed, "Am I glad to see you!"

He took Jerry's bag and walked along beside him as Jerry made his way to the elevators. The elevator cage was circular in shape, being a new experiment. It rode on a cushion of compressed air, balanced by a counter piston of approximately equal weight in a counter shaft.

As the door closed the elevator shot upward at breath-taking speed. It braked to a smooth stop at Jerry's floor and the doors opened noiselessly.

The hallway was thickly carpeted, muffling the steps of the two men as they walked down it to the door to Jerry's apartment.

"Have a good time?" Jerry asked as he opened his door and stepped through.

"Yeah," Orvis said. "I bought that house on the south side that my wife had picked out. Boy, it's a honey. How'd things go with you, Jerry?"

"Oh, fine," Jerry answered absent-mindedly.

In one corner of his room, wired together, stood the skeleton of one of the goat-man creatures Jerry had told Alex about. The others had been stored away to be placed later in the gigantic museum planned.

Jerry stood for a minute during his unpacking and gazed at it. To him it represented mystery. Mystery of an ancient race, and mystery of travel through solid rock. Mystery that exists beyond question, when there are such tangible proofs, but also mystery that may never be answered.

"Well, Orvis," he finally said, jerking his mind back to the present, "we're back in the harness again. When did you get back? Yesterday?"

"Yeah, yesterday," answered Orvis. "They want you down on section H. They said something about the gradient not being normal. They stopped work on the power bore two days ago, waiting till you got back to see about it."

"Did they say whether the gradient was too steep, or too flat?" asked Jerry.

"They didn't say," Orvis said slowly, "But I gathered they had stopped because they reached enough temperature before they went as deep as they should. I think they were afraid of starting volcanic action if they went deeper."

"Oh," Jerry said, relieved. "I was afraid for a minute they had a cold bore. Then there would be another section uninhabitable. We can't afford to have very many of them in the middle states, because God knows there will be plenty of them on both the Atlantic and Pacific coasts."

"Well, you know what all the workmen from Pennsylvania said about section H," Orvis said gloomily. "They insisted there were people living in caverns there already,

and we would have nothing but trouble."

"I know," Jerry said with a chuckle. "When we didn't find any they just said we hadn't gone deep enough. When we started the power bore they said it would be cold. Now it's too hot, so that proves there can't be caves farther down. The temperature at thirteen thousand feet or so is around three hundred, or they wouldn't have stopped the machine."

"Maybe," Orvis said darkly. "All I've got to say is: why, if it's so hot down there, do the rock chips come up cold? They come up hot from other bores much deeper."

"How do you know, Orvis? Did you see this for yourself?"

"Yeah. I was over there yesterday so that I could report to you when you came back."

"Well, suppose we go over and see now. I doubt if I could sleep with a puzzle like that in my mind." Jerry grinned in anticipation of returning to work. It was in his blood, as it always is with those who work in a continual atmosphere of danger and mystery.

THE elevator took Jerry and Orvis to the level where the trans-section railway station was located. Half an hour wait brought the Pennsylvania express, as it was called. They had no sooner been seated comfortably than the train began to move. A change of shift was going to work, so the cars were full.

Tunnels are peculiarly suited to high speed travel. In this particular one, for example, the original twelve-foot diameter of the bore had been reduced to nine feet by an inner wall, behind which ran power lines, communication lines, water pipes, etc. This smaller cylinder broke off at the bottom of the bore to leave space for the tracks.

The trains are propelled by eight foot blades which not only bite into the air and pull the train forward in the same manner as a plane, but they also pile up air pressure behind the train and reduce it in front so that the efficiency of the blades is much higher than they are for an airplane.

The train Jerry was on could go three hundred miles from a dead start to a dead stop in one hour without exerting its full driving power.

THE scene the two men stepped into at the Pennsylvania end was much different from that under St. Louis. There, could be seen no trace of the naked rock. Plastered and painted walls, tile- and rug-covered floors, and cool air conditioning made one forget that he was over a mile and a half under the surface.

Here the roughly hewn, circular tunnels with their rifling, the muted thunder of distant boring machines, the hot blasts of raw air, and the fever of activity made a different type of world.

Here was the frontier!

Jerry and Orvis climbed into an empty dump car and rode to the site of the power bore. It was at the lowest level, and could only be reached by dropping down the elevator shaft in a series of temporary lifts. The first dropped a hundred feet. Getting off that one, the two men use a ladder to climb down fifteen feet to the top level of the next lift, which took them another hundred feet lower.

Nearly an hour of this brought them to the bottom of the shaft, where another empty dump car took them to the top of the power bore.

Here the machinery was motionless. Its inactivity gave Jerry and Orvis a feeling of loss and insecurity that depressed them immeasurably.

The bore itself was four feet in diameter, with heavy spiral grooves which provided traction for the boring machine and the sections of bucket lifts.

These bucket lift units were twenty feet in length, with an endless chain of buckets that picked up the loose rock and carried it to the top where it spilled into a trough. This trough in turn spilled the loose rock into the buckets of the next higher unit, and so on until the rock was carried to the top of the shaft. Here the trough spilled the rock into dump cars which carried it to the nearest dumping ground.

For this area the nearest dumping ground was fifty miles away, where a huge, slanting fault had opened some time in the remote past and left almost a cubic mile of unusable space open.

Jerry went over to the control panel for the bore machinery. The temperature meter connected to a thermostat near the nose of the borer showed that the temperature below was a trifle over three hundred.

"Where are the men that were on this

job?" Jerry asked Orvis.

"They're over on the air-conditioner section," Orvis replied.

Jerry went to a field phone on a portable board and gave the number.

The foreman on the job came over to the power bore in answer to Jerry's call.

After the first warm greetings and inquiries about news on the surface were over he explained what they had run into with the power bore.

"I don't know how to explain it," he said. "The temperature shoots up and drops with no rhyme or reason. On the last day we drilled the temperature climbed to almost five hundred in the space of half an hour. Believe me we were afraid of an eruption. That heat at this depth could mean a rock flow. So we stopped drilling. When we stopped the temperature dropped back to the normal two hundred and ten at that depth. When we started in again it began to rise again. You know the thermostat is so placed that no overheating of working parts of the machine can touch it."

"How far down is it now?" Jerry asked.

"It's eleven thousand."

"Orvis says that the chips coming up are cool in spite of the temperature registration," Jerry said.

"That's right," the foreman answered.

"Well," Jerry said, "put the crew back on and start in again. But move the control panel back and block the power bore off. Keep going until the temperature of the chips is that for the usual bore at the right depth, or until the machine melts. Frankly I think there's something rotten in Denmark about this."

"That's what I think," the foreman replied. "But I didn't dare go ahead on my own. I had to wait for you to come back."

"You did the right thing," Jerry agreed. "It's only two days lost, and they aren't really lost if you spend them on the air-conditioner section."

CHAPTER XI

JERRY watched the temperature meter on the panel. Through the rock beneath his feet the muted rumble of the boring machine, far below, vibrated against the soles of his shoes.

For half an hour now the borer had

been running. From the very first revolution of the cutters the temperature meter had begun to act up. Jerry watched the needle anxiously as it climbed toward the melting point of rock.

He frowned in perplexity when it dropped again for no reason. His perplexity grew when it again rose.

The foreman standing beside him said:

"See? That's just the way it was acting when I shut it off day before yesterday."

Jerry's only reply was a grunt. Suddenly, his face took on an expression of new interest. He saw something the foreman had missed.

There was a definite pattern to the rising and falling of the temperature! It was a pattern similar to a Morse code, and utterly unlike any sequence that might arise from the boring or the operation of the machine.

"Shut off the borer," he ordered. "I'm going down there and see what's going on."

Half an hour later the last bucket of chips reached the surface. Jerry began his descent, riding the buckets which now were empty, the brakes and motors cut out.

The journey into the bore was easy. Standing on one bucket and holding onto the fourth one up, his weight started the belt downward. Before it had gained much speed he was at the bottom and had hopped onto the platform, to repeat the process on the next belt.

Coming up he would merely signal for the buckets to be started, and he would ride them up the same way.

The miner's light on his hard hat cast sharp shadows of buckets and struts on the side of the vertical bore as he went downward.

Coast. Step off. Climb on. Coast. Step off. The repetition became monotonous as he went deeper and deeper.

He began to regret his haste in coming down unarmed. If he found what he expected to he might better be armed. It wasn't too late to go back up and get some sort of weapon, but to do so would mean disclosure of his conclusions. The already active rumors about cave people in this vicinity would be given more fuel.

Somehow, Jerry thought, if there were men down below, they were probably intelligent. They wouldn't do such a senseless thing as hurt him.

The heat was growing terrific. Jerry's clothes were dripping wet. He knew that a thermometer would show close to one-hundred forty.

At last, just sixty feet above the borer, Jerry saw what he had fully expected. The corrugated bore had cut through a tunnel in the rock. A tunnel that ran horizontally.

In this tunnel **MUST** be some creature that had a heat ray of some sort. A creature intelligent enough to figure out what part of the machine was the thermostat, and play the heat ray on it to signal to those above.

Why? If the creature were inimical he would melt the borer or jam the buckets. The buckets could be stopped by hand, without a heat ray.

Why the signalling—unless the creature wanted to come down and investigate?

Jerry stood on the bucket platform and looked half fearfully at the round opening a few feet below him. The light from his lamp drove the darkness away from the mouth of the mysterious tunnel. But no man, goat man, or any other living thing could be seen.

CAUTIOUSLY he lowered himself on the frame of the bucket section. The bucket line would have carried him past the opening too far from the lip of the side tunnel to hop off safely.

He dropped even with the ancient tunnel the power bore had intersected, then stepped into it. It was about four feet wide and seven feet high, with an arching ceiling and flat sides and floor.

The surfaces of the floor, walls, and ceiling were smooth, almost to the point of being polished. The tunnel ran in a gradual curve to the right, so that beyond a hundred feet it curved out of view.

The boring machine had gone through to one side so that one wall of the tunnel was intact. Yet nowhere could anything moving be seen. The floor for several feet from the break-through was strewn with broken rock from the boring operation, but other than that there was not a sign of anyone, or anything living, having ever been here.

Jerry kneeled and directed his light downward toward the boring machine. The light picked up a flutter of movement. An arm waved feebly, but no voice sounded. And the arm was bare.

Without hesitating, Jerry leaped the gap to the bucket belt and started down. As he went he shouted encouragement. Whoever was down here must probably be near death. The signals had been for help. NOT the calm signalling of an alien, underground creature.

Jerry hopped off the bottom of the bucket line onto the top of the borer. His light turned to the figure lying beside the thermostat box and a gasp of amazement mingled with horror escaped his lips.

The figure was that of a man of normal build, white skin glistening with moisture, and brown loin cloth caked with rock dust from the borer.

The face, however, was startling in the extreme. Its expression was that of any man in great pain. The lips moved feebly in an agony of pain, caused obviously by the unnatural position of the right leg which was broken in several places.

But where the nose and eyes should be was nothing. That is, nothing but smooth skin. From the mouth the skin rose smoothly to cover a bald dome, interrupted only by a small, delicately formed ear on either side of the head.

The lips were normal in every respect, and had the capable fluidity of motion that comes only with speech.

"WHATEVER you are," Jerry exclaimed, "can you understand me?"

"Yes," the answer came in a low, resonant voice. "My leg is broken. I didn't see your bore and fell into it."

Jerry pulled off his trousers and started tearing them into strips.

"I'll make a rope of my trousers," he explained, "And strap you to my back. That way I can carry you up to where we can get this leg of yours fixed up."

The strange man said nothing. He had lain here for three days with a compound leg fracture, in a temperature of one hundred and forty degrees, or nearly that.

Jerry himself was growing weak from the heat. His head throbbed, and sweat blinded him continually.

And his eyes kept returning to that unreal nightmarish expanse of smooth skin where there should be a nose and eyes, and to the bald head that had obviously never been adorned with hair.

This was a man who must have been born under the surface, and whose an-

cestors for countless generations had been here. The implications of this being were more startling than the man himself.

Jerry's fingers trembled with excitement. What strange race had bred down below the surface, unsuspected except in superstition and the mad dreams of a few writers?

A thought struck him.

"How can you speak English?" he asked.

"I don't speak English," the stranger replied. "If you observe closely you will see that my lips do not move. I am conversing with you by telepathy."

Jerry watched the lips. They were tightly closed in pain. A thin stream of some sparkling fluid had dripped from the lips to the strong chin.

During this exchange Jerry's fingers were busy. Now he tied strips of cloth into a harness around the stranger's shoulders.

At last he sat down with his back to the man and secured the strips around his own shoulders. Now he could rise and carry the man, and have his hands free for climbing back to the top of the bore.

Rising slowly he lifted the stranger so that he hung free on his back. Then he climbed to the foot of the bucket belt.

Putting two fingers in his mouth he gave a piercing whistle. Almost at once the buckets started to move.

The figure on Jerry's back slumped suddenly. The man had fainted. But there was nothing to be done until they reached the top of the bore. Then doctors and stretchers could be obtained, the leg set, and anesthetics administered to relieve the pain.

As Jerry hopped from the buckets to the first landing and felt the limp figure on his back sway, he thought, "I'm glad the poor fellow fainted. These hops would be torture if he were conscious."

"I haven't fainted," came the reply to Jerry's unspoken thoughts. "I've merely cut off body feelings. Self-hypnosis, I believe you would call it. And I would suggest that before we reach the top you cover my head in some way. Otherwise too many people will learn of my existence."

"They'll learn anyway," Jerry protested. "They know nobody is missing. It doesn't make any difference whether you look like them or like a dodo bird. You're still a sensation. By the way, there must be more of you where you came from. Can you tell me about yourself?"

"That can come later," the man said. "You may as well know my name, though. I'm Lowahthy."

"I'm Jerry," Jerry said.

THE spot of light that had been a mere pin point at the start of the upward journey grew until at last the faces of the curious workmen could be distinguished. Half an hour after the journey started Jerry stepped from the bucket line onto the floor of the man-made cavern and willing hands relieved him of his burden.

In all the boring operations complete hospital units followed the workmen wherever they worked. No man was ever more than ten minutes away from a capable doctor, nurse and surgical equipment at any time, if they were needed.

So by the time Lowahthy had been lowered to a stretcher a doctor was bending over him, his unbelieving eyes darting from the fractured leg to the featureless head.

"We'll have to give him ether before I can work on him," the doctor said. He took the ether mask the nurse handed him, then paused in perplexity. How could he give ether to a man who had no nose and kept his mouth closed?

For that matter, how could the man breathe?

The doctor noticed a small puncture on the man's lower lip. A sparkling liquid was seeping from it. He bent over and examined the fluid. It was slightly green, and obviously neither blood nor any other normal body fluid.

Jerry was amused at the doctor's perplexity as he stood there with the ether cone and stared at the blank face.

"You don't need to give him ether," Jerry explained. "He's put himself in a state of hypnosis so that he can't feel any pain."

"Oh," the doctor answered, giving Jerry a piercing look. "Well, perhaps I'd better give him a shot in the leg anyway, just to be sure."

"NO!" The word screamed in Jerry's mind, and the doctor jumped and looked around, suspecting someone behind him had shouted.

"I don't think you need to do that, either," Jerry said. "Just forget about his feelings and fix up his leg."

"We'll have to take him to the base hospital to do that," the doctor said. "His leg

will have to be set under a fluoroscope. It's broken in too many places. Probably have to use metal pegs to hold the broken pieces in place."

Two men picked up the stretcher.

"Leave the power bore alone until further orders," Jerry told the crew foreman, then followed the doctor and the stretcher.

CHAPTER X

TWO days later Jerry sat at the edge of a hospital cot, upon which lay Lowahthy, whose face was now relaxed and smiling.

Amazed doctors had set the bones in his leg and tried to analyze the sparkling fluid that coursed through his veins. That they had been unsuccessful did not surprise them, because they knew that a fluid which could take the place of blood successfully, and also make lungs unnecessary, would be beyond the present ability of chemistry to analyze.

"Hello, Jerry," Lowahthy said, although his lips did not form the words. "I want to thank you for saving my life."

"That's nothing to thank me for," Jerry replied. "Anyone would have done it. But—would you like to tell me more about yourself now, Lowahthy?"

"I think that's in order," Lowahthy answered. "There isn't much to tell, but I suppose it will sound like a lot because it will all be new to you."

He lay silent for a moment, apparently collecting his thoughts in preparation for his story. Then he began, so slowly that Jerry could not at first be sure it was not his own thoughts.

"Years ago I was a man just as you," Lowahthy said. "I had a nose and eyes, and breathed. I was born on the surface. The town doesn't matter, nor does my name as it was then."

"I belonged to a secret order whose name I am not at liberty to divulge. This secret order has existed since prehistoric times. It has never advertised, nor has it sought to increase its membership indiscriminantly. Yet it is continually studying people for the express purpose of increasing its membership."

"There are a few 'front' orders affiliated with this group secretly and unknowingly, through which the initiate must go to reach the inner group."

"What I am going to tell you now must

remain secret for many reasons. I'm not asking for a promise of secrecy, because you will be unable to tell what you know. If the desire to tell ever comes to you, a peculiar complex in your brain will make you forget what you know temporarily so that you will be unable to tell.

"Far under the surface—farther than you would think it possible to go, is an inner world. There light is ever present, but not light as you know it. It's light that makes itself known to the mind or spirit of man, so that he has no need of eyes, but can see directly with his soul.

"Also heat grows less after it reaches its maximum a few miles down, so that the inner world is comfortable. And down there many changes are possible to the body which could not be effected on the surface, or even here in these new caverns.

"These changes are only possible near the neutral center of a great gravity field. You of the surface have always assumed that when a field is neutral it ceases to exist. Thus you have studied positive and negative electrical fields and derived their laws of behavior, and then assumed that when they neutralized one another they ceased to exist.

"Far from that being the case, GRAVITY IS A NEUTRALIZED ELECTRICAL FIELD. And at the center of the earth, where the ATTRACTION due to gravity disappears completely, the gravity field has not disappeared. Far from it. There the behavior of matter as you know it is subtly altered, due to the slower and weaker motions that it experiences. Electrical fields are weaker. Repulsions and attractions are weaker, and molecules, once formed, are more stable. Also light travels much slower.

"THERE are natural caverns and tunnels leading downward to this center which were discovered unknown centuries ago by races that lived on Earth before Man was created. These races knew all the mysteries of science, and had vast laboratories in the core of the planet which they probed into the mysteries of life and immortality. They are not there now because they have gone on to larger worlds where the gravity fields are greater, and consequently the effects at the neutral center of such a field more complete. But they left

much of their knowledge and their huge laboratories with their human students, as a heritage from the ancient masters of the elder races.

"It is there, in those laboratories, that I gave up my nose and eyes, which I would no longer need, to preserve my sinus cavities permanently from dust and germs, and gave up my blood for the ichor of the gods which would forever replenish the body tissue and preserve it from infection. It was there that the last atom of radioactive matter was drawn from my body tissue, and I was at last assured of flesh immortality! I still eat, although the amount of food I need would not keep your body alive. I still drink water, although I seldom need it, since I lose moisture only by perspiring.

"And in the years since this change was accomplished, my mentality has grown unhindered by bodily ills, until today I use my body only as a contact with materiality; able to roam the world and go from this planet to others in spirit, coming back to this body only as a bird returns to its roost."

Lowahthy became silent. In Jerry's mind pictures began to form.

He saw the goat men whose bones had been found in the cavern with no entrance. But now they were flesh and blood. They were members of the elder race. Not a mixture of goat and man, but a pure race developed on some far world in the dim past before the Earth had cooled and born life.

They were a strange race according to the standards of man. Growth to them was perpetual, as it is with the giant redwoods, or the ancient dinosaur. In mental power they were Man's equal, but surpassed him because of longer life. When Man is old and senile, losing his memory and mastery of things learned in his youth, a member of the elder race had just begun his mental growth and had centuries of development yet ahead of him.

Where Man is careless of the development of the average member of his race, permitting the less favored ones to remain in ignorance until they die, the elder race permitted fewer individuals to be born and took great care in their mental growth. To them a mind was the most important thing in existence, and they felt a tremendous responsibility toward it, to see that it reached its full power unwarped.

It WAS a grave responsibility, for the

fully developed Elder had the secrets of powers that could create or destroy worlds and races. If any of them had grown warped in mental stature it might have meant terrible catastrophe. An Elder who imagined himself a god might attempt to assert his power over the others, and the struggle necessary to subdue him would inevitably bring about the destruction of many worlds and perhaps many innocent races of younger intelligences. So the responsibility toward the young was indeed a grave one.

BUT thousands of years ago that elder race had departed, leaving the Earth for the young race of Man they had created by an artificial mutation on a naturally evolved race that had the necessary structure to permit development of the latent mind; hands with adaptable fingers, and lips that could be used for speech.

They had not left, though, until they had formed an inner group of men who knew the ancient secrets and who would see that out of each generation there would be new recruits brought down to the inner world and taught its secrets.

Master surgeons there were who replaced the heart with an imperishable pump, blood with ichor, lungs with storage sacs for perfect food and water; and otherwise remodeled the body so that it would be a perfect machine.

Jerry broke in on this telepathically induced vision to ask:

"Are there actually individuals who are thousands of years old down there? And what is the ultimate purpose of all this?"

The vision shattered and the "voice" of Lowahthy sounded.

"The oldest of us is only about five hundred years old. Even he will soon leave us, for after that length of time the spirit finds the body a hindrance rather than a place of refuge and security. When this stage is reached the body is left to die.

"Just as you when you were young played with toy construction sets, and later with small chemistry laboratories, and finally with huge cyclotrons and giant projects, so also a time will come when you no longer care to bother with these." Lowahthy's voice sounded far away and dreamy. "The time will come when your spirit will dwell on things you are not yet ready to learn. Things of the spirit and things of cosmic

structure. Then you will be ready to desert this mortal body just as you at one time turned your back on the toys of childhood.

"The ultimate purpose?" Lowahthy seemed to ponder this question. For perhaps ten minutes he did not move.

"I know you don't realize the import of your question," he said at length. "Perhaps you won't understand the answer I give. Let's just say I'm answering it to myself and you are merely overhearing. It's a question that I have studied long and never found the answer. Maybe even the elders don't know.

"It seems to our limited minds that there must have been a time in the universe when there was no single spark of life capable of thought as we conceive it. Surely, when a man is born there is one more spark of intelligence in the universe that wasn't there before. So perhaps there was a time when there were no intelligent entities, although it doesn't necessarily follow, since there are now infinities of hosts of beings, the least of whom are perfect beyond our understanding.

"The god the philosopher and the religious man have conceived as being the Creator is as nothing compared to These. The gods who have set themselves up to rule the hosts of the heavens, the gods who direct the courses of the stars in the firmament and guide the faltering spirits of man from his first fearful step into the Unknown until that faroff day when they, too, are as gods—are mere beginners compared to Those who have existed since before any Time man could describe. They were incredibly ancient eons before the Earth was born, and to Them the Time of the Earth is as a fleeting instant in their eternities of experience.

"What is the ultimate purpose? If anyone could know, it would be Them. And yet—there are those who claim to have asked Them, and They did not know.

"I think," and here Lowahthy's voice became reverent and hushed, "that the ultimate End is a universe that is one vast Mind, devoid of senseless matter. An Intelligence made up of infinite hosts of individual minds completely in tune, one with another, so that they function as ONE while yet being many. And yet, even though that is my opinion, I know it is full of inconsistencies that refute its possibility. I know, too, that such an opinion has been

entertained and discarded by Those beside whom I am but as a babe. And I know, too, that eventually I will discard that opinion and choose another. And that my understanding of the Ultimate Purpose will mark my grade of development forever. And that finally, when the Earth has become a dim memory in the Mind of the Universe, and you and I are far greater in wisdom and experience than either of us are now—perhaps I will conclude that there is no Ultimate Purpose. That if there were, there would eventually be a state of suspended development, forever in a state of stasis."

LOWATHY became silent again. Jerry's mind was whirling at the vastness of the thoughts he had been experiencing.

"Perhaps," Lowahthy went on quietly, "there is an inconsistency in the very idea of an Ultimate Purpose. Sometimes I can almost grasp the point in such a concept that defeats its own existence and makes it impossible of being. And then it eludes me and I feel a frustration and impotence. Then a Voice whispers from the depths of my mind that when I DO grasp that elusive understanding of the Whole, I will be ready to take wing and assume my place at the side of the Elders and the friends who have gone before me into the vastness of space."

He jerked his shoulders as if, by an effort, bringing himself back to the present.

"Do you have things that would help us end the threat of radioactivity on the surface?" asked Jerry eagerly.

"No." The answer carried a note of finality. "There is nothing that can stop that. And there is no need of my interfering with the way things are going. We tried to prevent it." There was a note of sad regret in his voice. "We tried to create public opinion that would prevent the use of atom bombs, and failed. We tried to get the atom scientists to see what would happen, but failed in that, too, until after it was too late."

"Are there lower caverns where the entire human race could go and be safe?" Jerry persisted.

"There are," Lowahthy answered, "but it is forbidden. If we were to open the lower caverns and what they contain, there are too many who would misuse the powers they would have. There are instruments

with which the mind can be molded at will, and through which a man can see with another's eyes, and hear with another's ears. There are machines which will transport the body through miles of rock and set it unharmed, even on a distant world. There are machines which can carve out vast chambers in the heart of a giant stone without any point of ingress or egress. But the uses to which they may be put are fixed by the Elders who made them. And we cannot violate their wishes, even though by doing so we might save humanity.

"Humanity," Lowahthy said, almost defiantly, "is just a small part of the universe. It will exist only for a brief moment. Then it will be gone. Please understand me. I would lay down my life for the least of you. You saved my life. I owe my present existence to you. Yet I COULD NOT VIOLATE THE TRUST OF THE ELDER RACE AND TURN MY BACK ON THE RESPONSIBILITY THEY HAVE GIVEN ME, TO SAVE THE HUMAN RACE. It IS being saved, in part. Or rather, the inevitable destruction of the human race is being postponed a few more thousands of years. But the death or suffering of any individual is not as important a thing as you think. In the eternity of growth of the individual a whole lifetime of painful suffering is but as a fleeting ache that is soon forgotten. An ache that as often is for the betterment of the person as for his hurt.

"But enough of this." Lowahthy's voice carried a note of finality. "I see that you don't understand my position. You think I have the power to save humanity and don't care to. Let's leave it this way; the power is there to save all of humanity, but I am only one against many like me. If I wished I could do nothing. I would be stopped before I could get started. And I don't wish to start because I can see the eventual outcome of such a course, and know it would be far worse for those saved than if they had perished, as they will."

"You're mistaken about my understanding," Jerry said slowly. "You forget that I am one of those who is letting a part of the race face its doom unwarned, so that the ones saved can be safe."

"Yes," Lowahthy said apologetically. "I had forgotten that for the moment. I'm sorry. I would like to talk with you further in a few days if you will permit me."

Jerry grinned. "You took the words right

out of my mouth," he said. He stood up and went to the door. There he turned and looked back at the strange man from the center of the Earth. The vacuity of features that seemed accentuated by the smooth skin that replaced the eyes and nose no longer seemed nightmarish. In some strange alchemy of the mind they had changed so that now they seemed the norm, and Jerry's eyes and nose seemed the trappings of barbarism.

Of one thing Jerry was now sure. There were more things under the sun than even Shakespeare had suspected he suspected. He closed the door behind him with a feeling that he would be very humble from now on. His achievements were no longer worth mentioning.

FOR the next three days Jerry was busy. His increasing responsibilities carried him to all parts of the underground system of tunnels, caverns, and transportation lines.

Mining operations were being begun in the areas under the western states, where huge underground deposits of copper had been uncovered. The power plants already in operation were being turned into a vast network of power which could be utilized by any section of the underground that needed it.

Each night, as Jerry returned to his apartment, he looked at the skeleton of the goat man and saw, in his mind's eye, the living creature, a member of the Elder Race that had created his own race.

The mystery of immortality still remained. Did man have a soul? Jerry didn't know. Death was an unknown gateway to this mystery. Lowahthy talked matter-of-factly of spirits, his own included, wandering the star ways, and finally deserting their bodies for good. If that were so, then death was not a horrible spectre, but a release. Certainty on that score would naturally change anyone's attitude toward dying. But without certainty there was always the possibility that death was the end, in spite of all the beliefs of humanity.

Jerry had to admit that Lowahthy's story of being an ordinary man whose body had been revamped to make it into a more perfect machine must be true. It was highly improbable that evolution had produced a creature that was human in every respect

except that it didn't have eyes and breathing apparatus.

Moreover, x-ray had shown Lowahthy's heart to be a platinum machine with no moving parts, something like the Lindberg Heart but with a more subtle principle of operation which involved no moving valves of any kind.

X-ray had also shown the lungs replaced by a large storage space containing several separate sacs which contained different fluids.

During the three busy days Jerry thought over questions he intended to ask Lowahthy.

Then, on the fourth day he again stood beside the bed of the mysterious man from the center of the Earth. The doctors had told him another day would see the leg strong enough to bear weight. The problem of what was to be done about Lowahthy once he could be on his feet again, and what was to become of the power bore that infringed on the tunnel of the strange man, had been shifted fully onto Jerry's shoulders—to be settled at this meeting.

But as Jerry stood at the bedside of his new friend he didn't know just where to begin. He wanted to know so much that he knew there just wouldn't be time to cover everything in a few hours. So he hesitated.

CHAPTER XI

LOWATHY watched his puzzlement for a minute, then said:

"I appreciate your predicament, Jerry. So suppose you just relax and let me cover as much territory as I can."

"Okay," Jerry replied with relief.

"First," Lowahthy began, "about what I will do. Tomorrow I will go back down the power bore and get into my own world again. Then I will seal off the tunnel and bypass it so that you can complete the power bore. After that there will be no fuss about my existence. I see that you have kept quiet about our talk of a few days past. There are only rumors, and those are only half believed."

He chuckled. Perhaps the only physical sound he was to utter in Jerry's presence, and his real voice had exactly the same qualities to the ear as his telepathic voice had to the mind.

"Right now," he went on, "those of the

workers who saw me are not sure they DID see me. Their minds, unable to rationalize what they saw, are in the process of denying it. The doctors will file away their x-rays and notes, and soon forget them. That will be seen to.

"As for you," Lowahthy hesitated a moment, "Jerry, you will soon be in complete charge of the underground. You are to be president of the underground federation and guide its destinies for many years to come. I would like to invite you to go with me back to my world, but I know your place is here, and here you must stay.

"I see you have many doubts. Some of them I can't resolve. Others I can. I can't prove to you that you have a soul that survives death, because whatever proof I presented could be explained as hypnotism. The evidence of others will always have an element of doubt.

"I CAN prove to you that you can leave your body at will. If you wish I will take you in spirit down to the center of the planet and show you some of its wonders."

Jerry smiled. "Perhaps I wouldn't believe what I saw. Could you take me into the future so that I can see what is to happen to us, and to the people left on the surface?"

"No," Lowahthy said slowly. "I could take you into my thoughts about a possible future, but the future doesn't exist. Only the present. With the permission of the Elders and my fellows I could show you a future, and then maneuver things so that it would almost certainly come true. Without their permission I couldn't interfere with the course of events.

"But there are so many details involved in a picture of the future. For example, radioactivity has certain effects on heredity. Survival factors are so complex that it isn't possible to see all of them. And some unforeseen thing might upset a whole theoretical picture of what is to come.

"It might be that the artificial mutation performed on the subrace from which the human sprung might be undone in fifty years by radioactivity, so that the old animal race might return again. It might be that some other race of animals or insects might attain to dominancy and the human die out or take a minor role. To tell the future I would have to know exactly what effects radioactivity will have on every gene pattern of every animal and insect alive

today. I would have to know every detail of the present and trace out every future relationship that will result from the present state. It may be that the surface world will find out what is going on under their feet and ruin all your plans, and the whole race go down into extinction. To know certainly whether or not that will happen I would have to know every detail of every mentality alive, be able to deduce every situation for the next couple of centuries, and, in short, have the development of an Elder God, which I haven't.

"So you see," Lowahthy said with a smile, "Prophecy is more than just casting a psychic eye on some All Knowing Source and reading it like a newspaper. I could prophecy that an accident will take place somewhere at a certain time, and then see that it does. I could prophecy that you will die on a certain date at a certain place, and then see that you do. Those are no more prophecies than for you to say you will do something, and then do it. Do you understand the impossibility of what you ask?"

"Yes," Jerry said. "I guess I have always looked at prophecy the way you say. I can see now how impossible it is."

LIMITED prophecy is always possible. For example I could tell you the exact date and hour you will be married because I know that already and you don't. I could tell you almost the exact minute Alex will die, because I know every detail of his condition, and have much experience in the course of disease and organ failure in people. I won't, because it would affect your relations with him.

"A future event is like the bottom of a funnel. If all the ingredients are already in the funnel it is possible to say a single event will take place at about a certain time—come out of the small end of the funnel. Otherwise anyone's guess may be more correct than my studied opinion."

"I can see that," Jerry agreed. "But could you show me what you think will be the future, knowing that I understand it is not infallible prophecy?"

"That would be a waste of time and *might possibly do harm*, Jerry. Suppose I told you everything would work out perfectly. You might relax and let what I say influence you detrimentally. Suppose I said there would be catastrophe. You might subconsciously feel it hopeless to fight

against fate. Especially if several of my predictions came true.

"In answer to all the questions in your mind I will make several statements. Those will have to satisfy you. None of them will be concerning the future, except the one already made concerning the fact that you will eventually be in the highest position of service in the underground civilization you have helped carve out of living rock."

"Sometimes I wish I weren't able to see so well abstractly," Jerry said with a laugh. "You have convinced me of what I already knew, I guess. I can't know the future. I can't know if I have an immortal soul. Things will go on just the same as they would have if you had never been here. So I will accept your statements and make the best of them. Fire away."

"Very well," Lowahthy smiled. "First, man does have a soul. It comes into being almost exactly three months after the egg starts developing into the human baby. Once formed it can never be destroyed. If, for some reason, it is not formed, the body may develop completely but the child is born dead.

"Second, when you die your personality will remain intact, but the thing known as consciousness is altered. Rather, something is taken away from it that existed in the brain-functioning and not in the soul-functioning. This alteration cannot be described so that any living person would understand it.

"Third, everyone eventually reaches the state of perfect development, although it takes longer with some, after death. The worst criminal eventually becomes a saint. The child born with a mind that is still blank when it dies will surely reach perfection of knowledge and development, too. So in the long run it doesn't matter that the children left to the mercies of the radioactive elements may die before they reach maturity.

"Fourth, the frame work of the individual's progress is his sense of values. As these change toward the time-proven ideal, the individual advances. Without a judgment as to relative value a decision cannot be made. Without a sense of values a judgment cannot be made. The sense of values of any individual is a tremendously complex thing. The play and interplay of this sense brings action, understanding, desire, ambition, and their opposites. The primary

purpose of education should be to develop this sense toward the ideal. Moral law is a generalization of certain standard conclusions based on the experience of a race or of the hosts of the heavens.

"Thou shalt not lie. Thou shalt not steal. All the commandments are based on conclusion from what will surely happen. There is no such thing as sin or righteousness in fact. It would be better to call them by their right names: successful and unsuccessful ways of attempting something. It is as correct to say it is a sin to do some trivial task carelessly as it is to say that it is a sin to kill another man. Neither is a sin, and both are ways of avoiding trouble which *inevitably lead to more trouble than they eliminated.*

"THE vastness of the universe is beyond the ability of man to conceive. As far as the most powerful telescope can reach, that distance is as nothing to the distances through which the star clusters drift, and in which they exist. Light can travel forever without getting any nearer the edge of the universe than it was at the start, for there is no end to it.

"Age cannot be applied to the universe, because it had no beginning. As it is, so it always was and ever shall be. Billions upon billions of years from now you, Jerry, will still exist and be aware of your existing. The certainty of this fact should alter your sense of values so that no short-range expedient will seem desirable if its inevitable consequences are adverse. Just as you would build a house to last a lifetime, and not just a day, so also you should build your life to stand forever, and not just till death.

"Understand all these things and you will progress. Accept them as so, if you can't understand them to be correct, and in the end you will have progressed just as rapidly."

Lowahthy laughed suddenly. "I guess I've been preaching," he said. "But tomorrow I will leave you and perhaps never see you again in this life. You will know that far below, toward the center of the earth, I am still living, and thousands like me. Our two ways are separate, yours and mine. Sometimes you may feel the probing of strange thoughts in your mind as I watch you through machines whose principles you should never try to fathom, lest in fathom-

ing them you leave them for irresponsible children to misuse. The things you will do—the things you have already done—will ensure the perpetuation of the race during the reign of fire that is to cleanse the surface of all its past errors.

"In the end, when humanity once again makes its home on the surface, it will make the Earth a garden of Paradise, free of harmful germs and insects, free of weeds and filth, and rich in the things that are good for man. Keep that in mind as you make your decisions and plans."

THE next day Jerry accompanied Lowahthy back to the bore from which he had rescued him. Together they descended to the tunnel through which Lowahthy had stumbled.

There they solemnly shook hands. Each felt a great attachment for the other, and regretted the necessity for this parting.

Then Lowahthy turned his back and walked swiftly down the tunnel. He was soon lost to sight in the darkness.

Jerry looked after the departing figure long after it had disappeared. Then, feeling a great sense of loss, he slowly made his way back up the bore.

At the top he phoned the foreman to come and resume operations on the bore. Then he went on to his other duties. And his thoughts turned to Cathy. Lowahthy had said he knew when they would be married. Jerry chuckled.

His feeling of loneliness turned in Cathy's direction. He decided there was no reason to wait further. He would take a leave of absence from his work and ask Cathy to marry him at once. Then he would bring her back with him. And maybe Alex and Olly would come, too. Olly could find plenty of work that he would love in the hydroponics department.

CHAPTER XII

IN THE beginnings of things time passes slowly. As they gather momentum time itself seems also to gather speed, so that at last the years brush by almost before they are noticed. It seemed that way often to Jerry.

The day he first read the Topanov-Chadwick Report, as it was destined to be named in history, took on the flavor of something in the dim remoteness of pre-history. The

events leading up to the beginning of boring operations stretched out in memory so that they seemed to cover years of time.

The first year underground seemed an infinite period of attention to detail. Then, as things began to operate with less and less attention, and the hundreds of men under his orders became thousands, all capable and all knowing their job, the days took wings.

Marriage immediately took on the feeling of a dream of long ago. Two weeks after Cathy became his wife and was installed in his—their—suite in the underground, it seemed like something that had always been.

Almost before Jerry could take a breath they had been married a year. And, by a contradiction of the mind, almost before he could get used to the idea of being married he was a father of a strong-lunged boy.

Alex had lingered long enough to see his grandson, and then, one day, he was gone. A name in history. A memory to those who loved him.

Jerry loved to feel the pulse of the giant living thing that was the underground he had done so much to create. He knew personally more of the men who worked on the frontiers and stretched them farther and farther—north, south, east, and west—than any other single man.

Nineteen forty-eight became unexpectedly nineteen forty-nine. Then fifty.

The radioactivity in the upper atmosphere was increasing measurably now. The time was drawing near when the inevitable would take place. Eventually the surface world and the underground would have to separate completely.

Meanwhile section after section of the underground was completing its quota and being declared a closed colony. One could travel hundreds of miles in any direction from Chicago and see nothing except completed works that would remain just as they were for the next two thousand years.

Jerry did not realize just when he became commander in chief of sub-surface operations. In June, nineteen fifty-one he became a five star general in the army. He regarded this rating as honorary, because he had never considered himself a soldier. There were other five star generals. These departed, one by one, for duty on the surface. Jerry was assigned their duties in addition to his own and thought nothing

of it.

Then one day he suddenly realized that for several months he had been the only five star general in the underground. It came as a shock to him at first. Then he told himself it was only temporary. He paid a visit to the surface and found that officially he was in sole command underground. He went back dazed.

One of his secretaries brought him the official order with its Whereas followed by a long list of his achievements which he had hastily skipped over months before without realizing their significance, and saw that he actually was commander in chief of the underground United States.

He read it quite slowly. And as he read his amazement grew.

"Have I done all these things?" he asked himself as he read the list of his achievements.

THERE was his plan to split sections, so that when a new group of people came below they did not become segregated into a colony by themselves, but were spread out through the established sections, while old residents were chosen to fill the newly completed section. He had thought (out of a clear sky) one morning that it would be a good idea so that the newcomers could learn the ways of the underground from more experienced old-timers. He had jotted the ideas down hastily on a scrap of paper and handed it to one of the immigration chiefs later the same day.

What was so wonderful about that? Jerry shook his head in bewilderment.

There was a long list of changes he had suggested in every phase of construction and in every type of machine. The list was staggering. He realized for the first time how much he had done.

Much of it he hadn't realized at the time. Men had quietly asked him things while he was intent on something else. He had answered absent-mindedly and they had gone away. Then, days later he would be pleased to note that his suggestions had been adopted.

He had never become aware of the fact that his suggestions were orders, or that officially he was giving orders. He had never stopped to think that invariably the things he suggested turned out to be the best possible way of doing them. It had been like—well, like working a problem on

paper that had no special significance. He just figured out the answers!

Now, suddenly, in the quiet of his office, he was realizing that more often than not the answers he figured out had been made into reality by the concerted efforts of hundreds of men working for days and months. And that just as often the results had become patterns which were repeated over and over again in each new section built.

And as the realization of how big a part he had played in the great undertaking struck him for the first time he grew afraid.

He was like a man who has shoved in his chips wrecklessly, thinking the game was for fun, and after winning is told he is rich. The thought of what might have happened if he had lost makes him tremble.

He was like a child learning to ride a bicycle who goes merrily along, thinking his friend is holding him up, and then discovers that for some time he has been alone.

The realization of the future importance of his every command, the realization of the responsibility he had held for months without knowing it, and which he would hold in the coming months and maybe years, and KNOW it, caused him to tremble and be afraid.

"How can I do it?" he exclaimed aloud. "How can I make a decision when I know that my decision will involve the lives and the work of thousands and perhaps millions of people?"

"You have done all right so far, haven't you?" The voice sounded with startling abruptness. Familiar, yet strange.

Jerry glanced up, alarmed. No one had entered the room. They couldn't enter without his noticing it!

Lowahthy stood near the door, his lips spread into a smile, the blankness of his face seeming as always a blind spot in the vision rather than an actual expanse of skin.

"I'VE been waiting for this moment,"

Lowahthy went on hastily before Jerry could have time to get over his surprise. "And now I must tell you something you already know, deep down in your heart, just as you knew there could be no such thing as prophecy, and no conclusive proof that you, personally, are immortal, until you die."

"Whatever you tell me I will believe," Jerry said simply. "I know you can't be

here. Yet you ARE here. I've often thought of you, and even at times imagined I could hear your voice."

"What I have to tell you is quite simple," Lowahthy said. "You have just become aware of your importance and it makes you afraid. So listen, and then you will be no longer afraid. How many of those Achievements on that list are YOURS? Actually only one. The suggestion to put rifling in the boxes so that the machine wouldn't slip as it cut. That was strictly your own idea, and a good one."

Lowahthy walked slowly forward and rested the palms of his hands on the desk before continuing.

"Some of the things on the list are my own ideas. Some are ideas of my companions far below, where we watched you from the very start. Some of the ideas on that list were first thought of by being out in space, for the welfare of Man is the concern of us all.

"Do you remember my saying that I could prophesy correctly only if I could get permission to see that my prophecy came true?"

Jerry nodded.

"We found in you, Jerry, a man completely sincere and devoid of self. At all times we have been with you and been an advisory council to you. You are not alone in your responsibility! You will NEVER be, so long as you remain as you are. Is it so surprising that the list of your achievements is imposing when you consider that it is the list properly belonging to minds far more experienced than yours, or mine? Some of them older in actual years than the human race itself?

"Do you remember that skeleton of a 'goat man' you used to have in your apartment before you were married? The bones in that once belonged to one of your advisory council! He is one of those who stayed behind to watch over the human race after the Elder Race departed. He is still here. And there are others—"

Lowahthy turned and pointed. Behind him, slowly emerging from a whirling mist that seemed to dissolve the walls and extend for hundreds of yards, was a host of creatures of incredible beauty and intelligence.

"Here is Sethantes," Lowahthy said, pointing to a Godlike figure whose high forehead carried a pair of horns that curved

upward and held back a heavy thatch of black hair. "He it was who performed the experiment that resulted in the human race. Because he did that he must be forever responsible for Man until that day when Man is no more."

"And here is Apollo," Lowahthy said, pointing to a figure of perfection. "He it was who patiently inspired Man to stand erect and admire beauty of form and strive for it. If it were not for him the human race would be much like the apes in shape. And because he is responsible for the present stature of Man he must concern himself with Man's welfare now."

"And see the others! Cpenta, Thor, Brahma, Po, Joshu, Moses, Capilya, Jesus and more than your eyes can encompass! You are not alone, Jerry! Look at them and never forget them, because when some problem comes up a small voice will whisper the answer. That voice will be from one of us. Remember that!"

AS A scene on a screen vanishes when the light is turned off, the scene vanished. Had it been real? Jerry didn't know. He smiled wryly as the thought of what Lowahthy had once said. It could be hypnotism, assuming Lowahthy had actually been present, or had been using one of his machines. Then, again, it could be just the product of his own mind, just as he had begun to think Lowahthy himself was.

What if it *had* seemed very real? Doesn't a dream seem real? That was it! He had dozed in his chair and his troubled mind, disturbed at the knowledge of his responsibility, had conjured up a dream that would provide something to lean on.

The more Jerry thought about it the more certain he was that it had all been a dream. The dissolving of the office wall to make room for the vastness of the gathering of images was definitely a property of a dream. That man with horns and legs like a goat was distinctly created by his own memory of what he imagined the hypothetical creature that had once owned those bones to be.

Yet—it was a comfortable dream. Already Jerry felt more at ease, and more confident of himself. After all, the hard work and the important decisions were all made. The underground was working perfectly, and without any more changes

at all it could keep on going smoothly indefinitely.

Jerry chuckled to himself. His office boy could run things now, so what could he have to worry about?

Nothing!

He dismissed the whole thing from his mind. Now that he knew what even the stenographers had known for months, he would carry on the same as always.

"Guess I'll go see how Olly is doing," Jerry said to himself.

OLLY was bent over a microscope when Jerry entered the huge laboratory. His left hand was manipulating the vernier screws that moved the glass slide about under the eyepiece, and his right hand, as if belonging to a different body, was rapidly sketching lines on a piece of white paper.

Jerry had never grown used to Olly's ability to focus his eyes independently, one glued to the microscope and the other watching a piece of paper on the table. He knew that all good microscopists had this ability, and that anyone could get it with practice, but it always made his eyes ache just to think of it.

He glanced over the large room while waiting for Olly to finish what he was on. It was a room about fifty by a hundred-fifty-feet in floor area, and ten-feet from floor to ceiling.

Along the walls were shelves, incubators, and other equipment. The central area of the floor contained two rows of benches and vats, and among these laboratory assistants were moving or engaged in some work.

This was completely Olly's baby from start to finish. In its way it was as important as Jerry's work, because here all the forms of plant life on the surface were being studied with the end in view of preserving them so that they could once again be planted on the surface when the two thousand years passed.

"Hello, Jerry."

Jerry's eyes jerked back to Olly as Olly greeted him.

"Hi, Olly," Jerry answered. "How's the work coming?"

"Fine. Right now we're working on the pine tree. We have the gene pattern solved, and are experimenting with the cell types. We may be able to preserve the conifers on paper without keeping specimens."

"How can you do that?" asked Jerry.

"Well," Olly explained, "Already we have determined that three of the cell types in the pine are identical with three in the vegetable types that will be grown in hydroponics. The only differences are due to environment. By that I mean the type of sap the roots send up.

"Cell classification," Olly went on, "is like chemistry, only more complicated. In chemistry we have the molecule. One type of molecule will act different in different environments. For example, crystalline salt behaves differently than dissolved salt. Yet they are the same.

"In organisms we have cells. They react to their environments, and if the living cell is isolated from its normal environment in the organism and immersed in different baths, it behaves differently. We've found that cells that seem utterly different are often the same type. There are actually fewer cell types than there are different types of organisms, just as there are fewer elements than there are compounds. In the whole vegetable family there are less than five thousand different types of cells.

"The reactions of these cells to environment are incredibly varied. In the common geranium, for example, a cell that would ordinarily develop into a branch with leaves and flowers, when placed below the surface in water or moist dirt develops into a root. In the cockroach a cell that ordinarily serves as a muscle cell, when bathed in nerve fluid develops into a leg."

Olly pointed to a glassed-in room at the far corner of the laboratory.

"Come with me and I'll show you something I made."

JERRY followed him. Inside the chamber the air was stifling. A half-dozen strange plants were growing in a bed of black muck.

"Watch this," Olly said, touching a leaf of one of the plants.

The leaf recoiled and the whole plant stirred as if alarmed.

"This," Olly said, "is a strictly artificial organism. It has both plant and animal cells in it. It has a nervous system, a heart, and blood cells. Its skeleton is strictly vegetable. The result is something that looks like a plant, gets its nourishment from the soil and the light globe in the ceiling, and reacts like an animal."

"You aren't planning on revamping the human race to look like this, are you?" Jerry asked in mock alarm.

"Well—" Olly said slowly. "I was thinking of asking you if you would loan me your son for an experiment like this. I thought I might remake him into an intelligent potato or something."

"I have a better idea," Jerry said. "Why don't you get a son of your own and try the experiment on him?"

"That reminds me," Olly beamed, "The doc says I *am* going to be a father pretty soon now."

"No! Well, congratulations, Olly," Jerry exclaimed.

The three plants nearest to Jerry quivered in alarm at the loudness of his voice.

The two men left the hot room and returned to the bench where Olly had been working.

"What I'm trying to do," Olly said, his mind returning to his work, "is map a technique so that for the next two thousand years my successors can continue along the same lines. The development of artificial organisms can be made into a fine art. The science of mutation can be mastered so that new species can be created at will. It's not too far-fetched to envision a race of dogs, for example, that are as intelligent as men. Or a variety of plant with an intelligent brain. I've already made a plant with a nervous system. It can't reproduce, but it lives, and it's made of cells that reproduce themselves and adjust themselves into an ordered system that looks like a plant.

"You know, Jerry," he said slowly, "We are living in a very special period. The things we do now are like seeds. During the next two thousand years, while Man has nothing better to do and can't go anywhere, these seeds will develop. I sometimes wish I could come back in a thousand years and see what my work leads into. I really do. *The materials of life are being put into the same class as the raw materials of other departments.* The art of making organisms will produce wonders we can't even imagine now."

"Do you think it could be used to remake the individual man into a more perfect machine?" Jerry asked softly.

"How do you mean?" asked Olly.

"Well," Jerry hesitated. "Do you think, for example, that blood could be replaced

by something better, if it's found? The ancient gods had elixir in their veins, you know. And do you think the heart could be replaced by something that would last longer? Something like the Lindberg Heart?"

"It might be possible," Olly said, startled at the thought. "I had never thought of all this in relation to improving the human organism. Such a thing would take time, of course. More time than I will live. The initial work would have to be done on different animals and perfected to the point where application to humans would merely be a routine application before it was even done the first time."

The two stood in silence for a moment, each in his own thoughts. Jerry was thinking of Lowahthy. Perhaps some day everyone would look like him, or at least have elixir in his veins.

Olly was thinking of the whole new vista for the future that his talk with Jerry had opened up.

"Well, I'd better get back to this specimen before it dies," Olly finally said.

"And I'd better get back to work myself," Jerry added.

CHAPTER XIII

THE break with surface America came in nineteen fifty-three. It was done by two simple directives. The first simply ordered the flow of people from the surface to the underground cancelled permanently. The second merely cancelled all leaves to the surface from the underground.

In the United States alone ten million people had gone underground. Eventually, if there had been time, ten times that number could have been accommodated, but the danger point in radioactive intensity was too close for comfort.

Probability is a wonderful study. For the single instance probability gives the chances of a thing happening a certain way. For the great number of instances it gives the rate at which things happen a certain way. With free neutrons in a given mass of matter of certain kinds, the probability of an increasing number of free neutrons being produced is less than one for a certain mass or volume, and a certain number of free neutrons. *But the probability curve climbs so that with a predictable number of neutrons in a given mass of material*

such as air the density of neutrons begins to increase instead of decrease. And nothing can stop it. Nothing except partitioning so that volumes of matter are less than critical.

Therein lay the real safety of the underground sections. Radioactivity breakthrough into one section could be stopped by quarantine of that section. Geiger alarm units were part of every section of the ventilation systems.

On the surface the atmosphere could not be partitioned. The cancer of neutrons set free in the atom bomb blasts of forty-five and six had pushed the critical density above the stability level. In the beginning of this, the increase in neutrons took place at the rate of about a thousandth of a percent a month. By nineteen fifty-three this increase in neutrons took place at the rate of almost a tenth of a percent a month. By the end of the century it was predicted there would be mild, chance accumulations of radioactives in the atmosphere that would drift along and finally disperse again. At first these would only produce mild burns on those exposed to the rays. But as the years wore on and the density of radioactive elements in the atmosphere increased, these radioactive gatherings, or Geig storms, as they were to be called later, would become lethal in intensity.

In about three hundred years the mean density of radioactives would become lethal, so that nowhere on the surface could life continue to exist. In the oceans life would carry on for another century. Then, as radioactive energy raised the atmospheric temperature to the boiling point, the oceans would slowly evaporate and form a white blanket in the stratosphere where the cold of outer space would condense the colorless vapor momentarily, and gravity would grip the droplets of water formed and hurl them surfaceward to once again become steam.

Then, even life in the ocean depths would die out.

Jerry and the other technicians who had carved out the underground refuge for life had overlooked nothing. They had even foreseen that a day would come when the cooling coils near the surface would no longer work. When the atmospheric temperature neared the two hundred mark, and the first few hundred feet of the surface grew too hot to cool the circulating water

in these coils, there would be no one left on the surface to interfere with their activities in preparation for the coming centuries.

Then grotesque figures in bulging, ray-proof suits would emerge from the underground and build giant refrigerating units. They were already blueprinted and the approximate date when their construction was to begin had already been set.

AVIATION would not become a lost art. In giant museums and in the pages of books stored below ground, every detail of knowledge of aviation would be preserved. And brief excursions by scientists into the stratosphere during the long twenty-century blackout of the skies would enable the race to keep check on the movements of the planets and the stars.

But aviation and astronomy would not be pursued to any appreciable extent. Instead, there were the arts of electronics, organism, music, writing, painting and the abstract arts and sciences to be developed to perfection. Two thousand years should see the growth of science into super-science, so that when the race finally climbed back to a surface once more friendly to life, the world could be made into a veritable Garden of Eden.

What of life on the surface at present, cut off from safety, still organized into civilized nations, and still containing the bulk of humanity?

It would go on as it had. There would be wars; perhaps even atom wars. It was possible that those left to their fate might even bring everything to naught by destroying the world in a gigantic war.

But as the Geig storms began to take their tolls there would be a retreat from the open fields, where food was grown, to the cities and surface caverns where the huge shields of masonry and stone would protect the dwindling populations from the searing blasts of miles thick concentrations of radioactives.

During these first years the death toll would be very great. The population would dwindle to a point where the food supply, whatever it turned out to be, would determine the total of the living.

And then, even they would go. There would inevitably be a last man, turning his bewildered eyes to the cloud-filled skies.

He will try to pierce the swirling, im-

personal mists that hide from him the blue of the heavens above, and the stars he has never seen.

He will turn his eyes dumbly on his fallen mate and look uncomprehendingly at the white blotches of burned, dead skin that rays he could feel but not see had burned into her. He will wonder why she does not smile at him as she did a few brief minutes before, not understanding death.

And then, perhaps, he will turn his back on her, and wander over the horizon in search of another mate, or even a scurrying newt or a small weed so that he will not be alone.

THE LAST MAN

*His dragging footsteps scrape the ground
Where once the clarion calls did sound
Of birds who graced the springtime air
With fluttering wings, and songs so fair.*

*With weary stride he climbs a hill
Once dense with life, but now so still;
Where once the crow made raucous sound,
But now his feet touch lifeless ground.*

*His footsteps falter; then he stops.
His shoulders sag, his young head drops.
His eyes look sadly o'er the scene
Where once was life and grass was green.*

*His eyes search o'er the naked plane.
They search in hope—but all in vain,
For he's alone and e'er shall be.
The last of all mankind is he.*

*His feet move slowly, then he's gone.
He wanders on, and on, and on,
Until at last when Life sinks low,
His footsteps falter and grow slow.*

*His dragging feet step on the sod
Where once men walked and worshipped
God;
Where children played, and puppies
romped;
Where cattle grazed, and horses stomped.*

*He wanders on in hopeless quest,
Not knowing it is all a jest
Of Fate, whom Man did think so kind
That She would never cease to mind.*

Wait! What is that atop yon hill?

*He cries aloud with child voice shrill,
And staggers as he hastens on.
But lo, 'tis gone. 'Tis gone! 'Tis gone!*

*The leprous sky now sears the land
Which once was sod, but now is sand.
No river winds around the hill.
Now all is silent, All is still.*

*No more shall children sing and dance.
No more shall horses run and prance.
No more shall flowers scent the breeze,
Nor shall their honey lure the bees.*

*No more shall dewdrops nestle where
There once were plants, for now Earth's
bare;
Her children gone beneath the sod
Where once men walked, and worshipped
God.*

TEN years after the underground world cut itself off from the surface all news from the surface was banned from general circulation.

The rising generation would be better off without the influence of such news. Jerry's son was now entering his early teens. So were thousands of other youngsters. They had been born underground and had never seen the sun.

In fact, they had no desire to see the sun, other than the curiosity that would prompt a surface youngster to go to the circus to see the elephants. To them the surface was a hostile place where people were wild and unable to live together in harmony. It was a place where radioactives would enter the body and cause tiny, scarring burns in the tissue that would prevent waste products from being eliminated, so that the body would grow old before its time.

Even to the oldsters, the people who had left the surface when they were already men and women, the surface seemed to be something they had read about, rather than lived in.

None of them felt the least desire to leave their well-ordered lives where lack of interest in something was considered an illness, and where you went to the doctor if you didn't feel perfect so that he could decide which vitamin you were short on, or in what way you should correct your diet.

Disease became a curiosity, and a disease

germ always made the headlines of all the papers and brought an army of bacteriologists, doctors, and engineers to the section in which it was unfortunate enough to be discovered.

Olly had become the head of the biology department of Chicago University, under Lake Michigan. From his graduating classes the students went into all sections and taught the science of organism, or went into the huge biological laboratories where the study of synthetic organisms was a giant enterprise, and mutation was rapidly becoming an exact science.

His courses were required in the study of doctors and surgeons. Biochemists were finding his teachings an open sesame to the discovery and production of more and more new substances.

In nineteen fifty-nine the first bank of milk glands from cattle started their production of rich milk from a liquid which might some day be perfected so that it could become an ichor of the gods, and course through men's veins in the place of blood. This liquid circulated through delicately adjusted tanks where it picked up the substances which the milk glands could change into milk, and at the same time replenish their own tissue.

It was a crude beginning, but promised much. Newspapers painted glowing pictures of meat factories where the choicest steaks could be turned out without the less desirable cuts, egg factories where hens' eggs could be made without hens, and other not so fantastic pipe-dreams.

It was even being debated whether it was worthwhile to keep the large zoos of surface animals, and the huge botanical gardens where trees and shrubs and grasses and grains were being perpetuated. Would the race need all these, when they once again could emerge from their low ceilinged home? There were even some who predicted that after twenty centuries in the perfection of the underground no one would care to return to the surface!

AS THE years went by, invention and improvement of existing products forged ahead in the caves and lagged on the surface. At first there was an attempt at mutual exchange of new inventions; but the ideologies of the two worlds became too divergent.

Above ground living became standard-

ized and invention turned to implements of war. Attempts at space travel were made, but with little success. Surface travel declined and travel by air took its place almost completely.

Things like refrigerators and automobiles and radios were standardized by the military government and ceased to improve. Invention turned to space ships, and few were the men lucky enough to get into a field of activity where originality was permitted.

Beneath ground aviation and space travel were of course left completely alone. Education, creative work, and invention were the main pursuits of the bulk of the population.

Every man had the entire resources of the nation at his disposal insofar as he was able to put them to sensible use. Every man could have the full benefit of the educational facilities, because money played no part in what a person could have.

By nineteen sixty even the literature of the sub and surface worlds were incompatible, so that exchange became undesirable to both worlds.

And when nineteen seventy came all contact with the surface was cut off entirely. During the following thirty years the surface world went on much as it always had. Occasional wars made wrecks of some parts of the globe overnight, and then peace would return.

But war as it had been known previous to the atom bomb was no longer existent. Large concentrations of land and sea power were vulnerable to bombing, and wars were started and ended before any considerable number of troops could be mobilized for battle. So war reached the ultimate in simplicity. Those who were in its path died, while those it missed went on as though nothing had happened.

The Jones' of Tulsa, Oklahoma, and the Smiths of Butte, Montana, and the Myers' of Squeedunk, Anystate, went their peacetime ways, taking meat out of nineteen fifty model refrigerators made in nineteen seventy in government factories, riding nineteen fifty-three model town sedans made in nineteen sixty-five, and the news of the destruction of San Diego, Detroit, and the crippling of Chicago and New Chicago by atom bombs in the undeclared Federation War left their daily routine

unaffected.

It was only in little ways that their lives were touched. Mrs. Smith's next door neighbor would whisper that the Ripleys, down in the next block had been ordered not to have any more children because their gene pattern had gotten mixed up, whatever that was. Maybe it was some new kind of a disease.

Mrs. Brown would come home from the hospital with the vague story that she could not bring her new baby home with her because it "wasn't right." No, she didn't get to see it and she was heart broken.

Then there was the new epidemic eczema that was breaking out all over the country. Whole communities would break out with the skin disease, and the government was issuing a special salve for it to everybody. It was caused by some virus that lived in the air, but which couldn't be isolated.

As late as nineteen ninety-nine there were sportsmen fishing in the streams and hunting in the north woods during their vacations from work.

And Christmas, nineteen ninety-nine was the biggest in history, the last Christmas of the greatest century of progress ever known!

January first, two thousand A. D. was just around the corner. During Christmas week there was a hushed expectancy in the air, as if the beginning of another century would bring a visible change—something dramatic. When New Year's Eve came, this feeling changed subtly.

AT THE stroke of midnight the parties of loud, celebrating people were strangely absent. In their place were small groups, huddling silently on street corners or standing on roof tops, waiting for something which they could not guess.

These subdued gatherings existed all over the world. In Russia, Spain, China, South America, North America, they were all the same.

Rumor was rampant. Some unnamed country was going to make a try for world dominion. Christ was coming again because two thousand years had passed. The end of the world was coming.

None of these happened. Nothing happened. Yet, as January passed and February drew to an agonizing end, the world wide hysteria increased rather than lessened. It infected everyone from the

dictators and rulers of the nations down to the humblest workers.

CHAPTER XIV

CROP failures were the rule rather than the exception in two thousand, A. D. These were due to two causes. One, hybrid seeds were growing into ancestral plants. This failure of strain had been going on mildly for several years, but in the summer of two thousand every strain of grain and vegetable grown seemed intent on reverting to the wild stock from which it had originally sprung.

Thirty-eight percent of the pigs born that year were scrawny razor-backs, regardless of their parentage. Wheat averaged five bushels to the acre. Corn was almost completely a failure due to disease. Oranges were tiny and sour, apples were small and tough.

Potatoes remained unchanged in form and produced a bumper crop. Carrots, by some unpredictable whim of fate were unbelievably large and tender. Five pound carrots that were sweet and tender crowded one another out of the ground.

But in every country the total of crops was not enough to feed the population during the winter.

Reversion of strain to ancestral stock was not the only reason for crop shortage, however. The second, and perhaps most disheartening cause was the high death rate among farm workers. For some reason they seemed peculiarly susceptible to the strange exzema that came and went mysteriously. Thirty thousand farmers died in the fields while at work during the year.

Fifty thousand more were incapacitated by it. And thousands of acres of crops went unharvested, while other thousands of acres were harvested by the government with drafted workers from the factories.

The winter of 2000-2001 saw the fall of organized government. Starving people raided warehouses filled with food and guarded it with guns they took from the armies sent to overcome their resistance.

Peoples all over the world broke up into small tribes, raiding one another for food supplies, and even killing off their own comrades to make the food stretch further.

Few fields were planted in the spring of 2001. Almost none of them were harvested.

The last newspaper known to be pub-

lished was the Seattle Press for July 18, 2001. Its headlines were OLYMPIAN GOVERNMENT SEIZES KENT BEAN CROP.

A small item on an inside page read: "Giant cockroaches chase chef out of Olympic Hotel. A horde of large cockroaches, some of them almost two inches long, overran the kitchen at the Olympic Hotel Restaurant this morning, carrying off three bushels of carrots, and driving chef Johnson out into the street when he tried to protect the only food left in the once famous eating place. He states that the roaches seemed to come from a drain in the basement floor, pushing out the screen that covered it."

Another item read:

"Stay indoors. People who spend most of their time indoors are least susceptible to the dread exzema that afflicts most of us. Its cause is still unknown. It has grown to such proportions that it now kills more people than all other diseases put together."

IT SEEMS incredible that no one discovered the cause of the widespread "exzema" and the universal reversion to ancestral form of both plants and animals. It seems that the densest of mortals should have looked into the sky and seen the cause of it all. But there seemed to be a mental reversion to ancestral denseness in the people that kept pace with the accumulating evidence of radioactivity as the cause of it all.

People ceased to think beyond their own immediate needs. The fall of government and the rise of local groups at war with one another perpetually seemed to be taken without thought. It seemed immediately logical, so there was nothing to get alarmed about. Perhaps the beclouded minds of occasional thinkers wondered how it had ever been possible for whole groups to live in harmony, but for the most part the thinkers lost out to the more active doers and lost what food they had, and starved to the point where they had no time or inclination to philosophize on existing conditions.

This mental denseness was due in part to the general decline in education after nineteen seventy, and to the fact that what education there was consisted mostly of practical trade and technical subjects. With the end of democracy, study of gov-

ernment and history was confined to the more advanced military colleges not open to the public. And with censorship of news the knowledge of what other peoples were doing and thinking was cut down to a bare minimum.

The transition from large nations with powerful well-knit governments to complete disorganization and the eventual family group in a state of hostile truce with its neighbors, as it took place between the year 2000 and the year 2005, went entirely unnoticed by the underground.

It was Jerry himself who discovered it. On his hundredth birthday, June 14, 2019, he expressed a desire to listen in on some surface radio, just to see how things were going "up there."

He had retired from active life twenty years before, but he was still revered as the father of his country.

The long unused radio tower on a desert in Arizona had been hooked in a radio that was hastily put together, and most of the day was spent in trying to discover why the set wouldn't work.

It wasn't until several days later, after a flight over part of the United States, and the building of a transmitter to prove the receiver would work, that it became certain that no broadcasting station on the surface was working, and that organized government was dead.

At once plans were made to help the surface people as much as possible. With education gone and people living like savages, their bodies too polluted with radioactives to bring down below without infecting the caves too, it was decided to make Geiger counters and teach as many people as possible how to use them to detect Geiger storms and also teach them where to go to escape the full force of the rays from the atmosphere.

Laboratories were built into the bomb shelters near the surface, where individuals could be brought in and examined for the effects of living in radioactive surroundings. Here attempts were made from time to time to de-activate their bodies so that they could be adopted into the race. Those taken in were soon sent away as being too far gone mentally to do much with.

The "specimens" returned to surface life with stories about giants living underfoot. These spread, and with the physical proof embodied in the Geigs, brought about a

gradual respect for the "giants" whenever they appeared.

LIFE expectancy on the surface had been seventy years in 1950, according to the records. Other records discovered in New Chicago disclosed that life expectancy had dropped to fifty years by the year 1995.

Observation by cavern scientists from 2023 to 2030 showed that the life expectancy had dropped to twenty-five years, and that the oldest surface man was probably no more than thirty.

At the same time parenthood was coming at the age of ten or twelve, and sometimes even earlier.

Exploration of the surface filled the newspapers with interesting items for discussion.

"With old age creeping down and crowding the age of reproduction lower and lower," many people would say, "will the surface race end by its individuals dying of old age before they are old enough to reproduce? Or will the race adapt itself and reproduce earlier than our ancestors could possibly have done?"

"Will the race die out from starvation first? Or will it die out because it can't reproduce early enough?"

The news that cockroaches had become a major source of food for people on the surface created only mild interest. Only a few of those who had first come down were still living, and many of these had never seen a cockroach.

The roaches of 2019 were six inches long and very numerous. Able to run at prodigious speeds, they raided the countryside, leaping twenty feet to land on the unwary fieldmouse, or, when small animals were scarce, systematically cleaning whole fields of every shred of vegetation.

At night they swarmed back under the cities, making the dried-up network of sewers their home.

JERRY died in 2022 at the age of one hundred and three. Just as his life had symbolized the spirit of a free, adventurous America as it had existed prior to the atom bomb, blended with the cool, analytical courage of those who boldly carved out a whole new world from stone and made it work, his death symbolized the promise for the future of mankind.

On the surface childbearing came earlier and earlier. Under the surface it came later and later. On the surface old age crept down the years until children were old in their teens. Under the surface old age was becoming an almost curable disease, and life expectancy based on death statistics had crept up to near the century mark with no ceiling in sight.

The two branches of the race had diverged to the point where they could hardly be said to be the same species. Indeed, the giants of the caves did not consider the surface dwellers as being brothers. They looked on them as nineteenth century man looked on the pygmies of Australia, and eighteenth century man looked on the negro races of Africa that he raided for slaves for his plantations.

The last man in underground America who had been born on the surface died in 2041. The event did not create even a ripple in the course of history. Years flew by.

In 2100 A. D. the generation of man on the surface had dropped to nine years and the life expectancy to eighteen. In the caves the generation had increased to twenty-eight years and the life expectancy to one hundred and seventeen.

In organism laboratories there were dogs over twenty years old with platinum hearts, no lungs, and elixir coursing in their veins.

And musical composition, advanced mathematics, and four years of logic were required studies in all colleges.

PART THREE

CHAPTER I

RON looked thoughtfully at his latest figure, drawn on paper. It was hardly the equal of the doodling of a twentieth century man with his mind on a telephone conversation, yet to him, for a moment, it was a masterpiece in which his mind's eye could see an exact resemblance to a roach lying on the pavement ready to eat.

He beckoned his wives peremptorily to come and look at it. Amy, Betty, and Mary obediently dropped their own pencils and trooped over to view his masterpiece.

They looked at it doubtfully and Mary asked, half fearfully, what it was meant to be.

Ron's proud grin faded. His eyes, which had been looking for the instant appreciation he had expected, turned back to the drawing.

Gone was the resemblance to a roach. There was nothing but a senseless jumble of pencil scratchings. His eyes rose from the paper and looked around at the smooth walls and the clean floor on which he sat.

They turned questioningly to the transparent glass wall behind which several students sat watching him. Youthful giants with quiet, intelligent faces and friendly, curious eyes.

But now something was missing there, too. The smooth walls and clean floor seemed like the foolishness of children. The magic of the invisible wall seemed unimportant, and the students behind it were less than human.

Ron knew, as he had always known since he came here, that these friendly giants with their pleasant magic were weaklings. The most hardy of them would not have survived a day in the shadow of the el. It hadn't mattered before, but his eyes clouded with tears of pity for these soft, friendly giants and homesickness for the daily thrill of catching the beady-eyed roach.

Most of all he missed being king of all he surveyed. The magic of a paper and a pencil were as nothing to the feel of a hook sinking through the hard back of a roach.

The queer tasting foods and tasteless capsules he was given to eat could not compare with the white, juicy meat of a freshly-killed roach with its warm smell.

Sure he liked not having to keep a weather eye on the Geig for storms. But the eight-foot ceiling of his new home pressed down on his spirit.

He longed for the Loop, where he could gaze up at the sky and see patches of cloud beyond the tops of the buildings, and where sometimes he could sit just inside the protection of his building and listen to the wind as it picked up the dirt in the street and played with it, forming it into swirling vortices which it pushed along.

He missed his occasional excursions down to the lake where he could squat on the shore and watch the waves break against the rocks.

All that had real meaning. It was a man's world. This—Ron looked around

with wide eyes. There was nothing here for him. Of what use was it to make senseless scrawls on paper and learn how to tell what they mean? Of what use was it to ride in cars which went faster than a man could run?

Ron dropped his pencil slowly to the floor and stood up. Oliver had just entered the space where the students were. When he glanced at Ron he smiled and waved a cheery greeting.

Ron frowned and beckoned for him to come through the glass wall.

Oliver took a suit off a hook on the wall and did so.

"What is it, Ron?" he asked. "You look like something's upset you."

"Nothing has upset me," Ron replied. "I want to leave now."

"Why?" asked Oliver in anxious alarm.

"I can't explain it," Ron answered slowly. "I don't think you would understand."

"Tell me anyway," Oliver said softly. "I can try to understand."

RON noticed the flashing expression on Oliver's face. It was the same expression he had felt on his own face the day before when his son had asked him a silly question and he had given a crazy answer which he knew his son would think over seriously, and not suspect he was being made sport of.

He glanced at the dark-colored mikes on the ceiling that were sending his voice through to the students. He caught their carefully hidden smiles of amusement. He suddenly realized that they were amused that he could have the "conceit" to think he might know something their giant minds couldn't understand.

Ron's eyes grew cold with a sudden contempt for these soft giants. They were patient, plodding—insects. They were slow and stupid, like a roach that has been feeding well for several days. He knew that if he suddenly bent over and picked up his sharp pencil laying on the floor and plunged it into Oliver's soft belly his eyes would blink stupidly for a moment before the realization would sink in that he had been attacked.

He knew there were lots of things these giants didn't understand. His vivid memory recalled their reactions to his questions about where he would go when he died.

They didn't believe what they said! They considered him in the same light that he considered his infant son.

"Tell me," Ron asked sternly, "What is the use of all this playing with pencils and books? What will it do for me?"

"Why Ron," Oliver said gently, "It will make it possible for you to learn many things. Your understanding will increase."

"If that is so," Ron said triumphantly, "why is it that you and those (pointing to the students who were watching with intense interest now) can't understand that I am a man?"

"We know you're a man," Oliver remonstrated. "But you must understand that life is more than just being a man. You must learn the mysteries of nature. You must learn the history of the past, and how to live with your fellow man."

"Then why don't you go to the surface and learn the thrill of catching a roach?" Ron demanded.

"That isn't necessary for us," Oliver objected. "Nor is it any longer necessary for you," he added.

Ron parried this with a blink.

"Tell me, Oliver," he asked, "what is the most important thing about living?"

"Why," Oliver hesitated. "I think that learning is the most important. Mastery of nature and understanding of all things, or at least as much of an understanding of all things as it is possible to get."

"Do you have that understanding?" Ron fired.

"Perhaps more than you think," Oliver smiled.

"And perhaps not," Ron answered. "Tell me, is there anyone among you giants that you don't like very well?"

"I suppose so."

"Why?" Ron asked.

Oliver frowned. "Perhaps because he is selfish and inconsiderate of others."

"And he can read?" asked Ron.

"Of course," Oliver said in mild surprise.

"Then why is he selfish and inconsiderate of others?" Ron asked triumphantly.

"Reading has noth—" A light of dawning comprehension appeared in Oliver's eyes. He looked at Ron with a new respect and Ron's heart beat faster at that look. It was the first time it had been given him by the giants, and on the surface anyone who did not give it met violence.

"I think I see what you mean," Oliver

said slowly. "Yes. I really think I do. You may be right. It's so long since such problems were really problems down here that we have forgotten about them."

RON looked at Oliver puzzled. Oliver didn't notice this. He was looking at the students behind the glass wall. And in his mind he was seeing the same things Ron had seen a few moments before.

His eyes turned back to the child-figure that was Ron. He took in the self-reliance and self-confidence that could and had faced almost certain death carelessly to satisfy his curiosity. He noticed, perhaps for the first time, the capable bearing of this orphan of the surface.

He turned back to his students. Those qualities lay dormant there. They MUST still be there, or the race would go down. Would they last through two thousand years of easy living with nothing to test them? That was really a question. *Can courage last for a hundred generations if there is not a single event to bring that courage to life?* Can a man without thinking risk his life or invite certain hurt to his body if all his life he has been taught to avoid risk and danger, and his father and father's father before him have been taught the same thing?

How long could the qualities *that made a man* lay dormant without dying out? Ron had recognized that they were not here. Oliver had noticed the contemptuous way Ron had looked at his abdomen and the sharp pencil lying on the floor, and guessed the thought that had passed through Ron's mind.

He wondered. What would it be like to face physical danger? To him it was an academic question, but someday it might become very real to the race of man.

"I'll have to write a thesis on that question and see that the possibility is taken into account in our education system," he mused silently to himself. In the back of his mind a question insinuated itself. "Would our ancestors consider us sissies?"

"Well?" Ron's voice interrupted Oliver's thoughts.

"When would you like to go back to the Loop?" Oliver asked.

"Now," Ron answered, the vision of a square meal beckoning him.

"All right," Oliver said sadly. "But, Ron, would you come back sometime and

see me. We are friends now, and I'll miss you."

A look of pity appeared in Ron's eyes, but he veiled them hastily so that Oliver wouldn't guess.

"Yes, sir," he answered.

RON sat on the curb, his small bare feet in the gutter, eyes aglittered with intense excitement. Beady, faced eyes appeared in the gloom, several feet down the circular well that yawned at his feet.

He stopped breathing, hoping that he smelled enough to entice the insect out of its hole. Firmly grasped in his right hand was a shiny, untried metal hook with which he hoped once again to catch a wary cockroach and drag its squirming body out onto the pavement. Then—how many lifetimes it seemed since he had REALLY had a good

meal!

In the gloom of the street opening to the building at his back three female figures crouched, breathless.

A playful breeze sent dancing, miniature whirlpools of dust along the street. And overhead through the gaps in the structure and the tall buildings white clouds drifted lazily across a blue sky.

The soft murmur of waves beating against the shore of Lake Michigan bounced in echoing cascade from wall to wall of the buildings.

A distant roar that rose and died out bespoke the falling of another building somewhere, blocks away.

The cockroach hooked its front legs over the edge of the hole and sniffed at Ron's feet.

THE END

Editor's note:

By now you have undoubtedly realized the truth—that we have deliberately misled you regarding "So Shall Ye Reap." This novel is NOT a story of what might happen if the atom war came—it is a story of what MAY ALREADY HAVE HAPPENED. Merely grant the possibility of Mr. Phillips' premise—that the five bombs already exploded have placed a lethal seed in our atmosphere, then the story he has told is already happening—and NOTHING ON EARTH CAN STOP IT. Think about that, mankind! We hope this story is fiction—but what if it isn't? WHAT IF IT ISN'T?

FLIGHTS OF IMAGINATION



By

MILDRED MURDOCH



EACH year scientific advances bring closer the day on which men will actually visit other planets. For thousands of years they have considered the possibility, and many theories and conjectures have been advanced as to what would be found on planets other than our own.

Back in the year A.D. 160 a Greek philosopher named Lukian wrote the first stories on interplanetary travel. His imaginings are interesting, although he prefaces his book titled "True History," with the warning that the things written of did not and could not have happened and that readers are not to believe them.

In one story, a ship was caught in a great wind and lifted up from the sea. The storm carried it higher, and for seven days and seven nights the voyagers wondered what was happening to them. On the eighth day they reached the moon. Here they were soon surrounded by warriors astride huge three-headed birds. The earth men were taken to the king, who spoke to them in Greek. They were told that the moon was on the brink

of war with the sun. Immense armies were ready for combat. The infantry numbered sixty million men. One hundred thousand made up the cavalry, some riding the three-headed birds, others riding cabbage birds, these being enormous mounts covered with a dense growth of cabbage deep enough to hide a man. When any of Lukian's moon inhabitants died, they helped keep the place clean by dissolving into smoke and vapor.

In another story Lukian had a hero named Icaromenippus who got to wondering about the moon and stars until he finally decided to go there. With one vulture wing and one eagle wing, he simply taught himself to fly then took off for the moon. After satisfying his curiosity about that planet, he decided to fly on to heaven itself. After three days' travel, he arrived in heaven. The immortals resented this untimely intrusion by an earth creature, and Mercury was ordered to return the man to his own world. He did so, and then took away the wings of Icaromenippus, thus preventing him from flying again.

THE END

SCIENTIFIC

The most massive artificial edifice in the world, not excluding the Egyptian pyramids, is the pyramid of Quetzalcoatl at Cholula, which the Spaniards failed to destroy, and therefore attempt to cover with earth to hide it from the sight of man. Strangely enough it was Quetzalcoatl who predicted this very fate for the pyramid, many centuries before it actually happened. This uncanny foresight has never been satisfactorily explained, and it remains a mystery of the old Aztecs.



It was predicted by Quetzalcoatl that white-skinned foreigners would rule the country, during which the pyramid would be covered, but that the day in which it would again be uncovered would mean the golden age of the Americas. It is no wonder that the superstitious Mexicans put up such a half-hearted resistance to white conquerors.



The Nahuas undoubtedly came from the Indian Ocean or from the coast of Java. There are many indications that this is so: the similarity between the names Hueman and Hanaman; the similarity of the Nehua dress to that of the Malay; the realization that the Nahua resting-places on the famous migration could have been islands.



Fuqua

MYSTERIES

UNTANGLING THE ORIGIN OF THE NAHUAS

By L. Taylor Hansen

Where did the powerful Nahuas come from? The answer to this question is of great importance in our story of the past.

THE nations of the Nahuas form one of the largest blocs in the Amerind ethnological and cultural picture. In the center of their great culture stands the golden civilization of Tula, the Magnificent, and her people the Toltecs, while upon the outermost fringes, probably crossed in blood with savage neighbors to the north, are the Aztecs, whose empire under Montezuma was overthrown and sacked by Cortez.

It was among the ranks of the Nahuas that the great battle of the religions took place, probably during the eighth century, which resulted in the overthrow of Tula, the Magnificent, and the return of the sacrificing priesthood into power in Mexico.

According to Mexican legend, it is this civilization of Tula which must be credited with an agriculture far beyond that discovered at the time of the conquest, which was in itself very rich. (See Bernal Diaz, True History of the Conquest of Mexico.) It was also this civilization which was remembered by Mexico for its ability to grow cotton in colors so that it did not need to be dyed (see Song of Quetzalcoatl), an art not to be found elsewhere in the northern continent but quite typical of antique woven pieces from the southern continent, among which the world's most exquisite samples of weaving of all time are to be found.

It is the beauty of the architecture of Tula, the Magnificent, which haunts the imaginations of the Aztec Tenochtitlan, itself a fairyland of beauty to its conquerors who had eyes to see and record for us—such as those of Bernal Diaz. And it is to the industry and religious fervor of the old capital, with its reverence for its Great White Prophet, that we have the most massive artificial edifice in the world, with all due respect to the Egyptians, in the Pyramid of Quetzalcoatl at Cholula, which, foiled in their attempt to destroy, the Spaniards covered with earth, after partially wrecking same.¹ Strangely enough, speaking of uncanny predictions, Quetzalcoatl told his followers that they would some day forget his teachings and the pyramid would fall into neglect. This period would be followed by the coming of a race

of white-skinned foreigners and many ages of foreign rule during which the pyramid, it is to be induced, would be covered, for he continued by saying that when the day came when it would again be *uncovered* the golden age of the Americas and her people would at last arrive. It is no wonder that the superstitious Mexicans put up such a half-hearted resistance to the white conquerors, or that they still regard the pyramid with such a dumb and silent adoration.

Searching behind Tula for the origin of the Nahuas, for which we must grope before we can attempt to go beyond them, we come across the Cakchiquel Annals from the notes of Brasseur upon the Popul Vuh. Brasseur quoted from this book rather liberally, which is fortunate, for though it has been mentioned by other authorities of his day, it has disappeared since the death of Brasseur. One such quotation is plain enough concerning the origin of the Nahuas.

"Four persons came from Tulan, from the direction of the rising sun, that is one Tulan. There is another Tulan in Xibalhay and another where the sun sets, and it is there that we came; and in the direction of the setting sun there is another where is the god; so that there are four Tulans; and it is where the sun sets that we came to Tulan, from the other side of the sea where this Tulan is, and it is there that we were conceived and begotten by our mothers and our fathers."

This statement certainly marks the Nahuas as Westerners, and marks the "greater descent" of the Mayan people as later Nahuas, and since the Tutul Xius give the name of a Nahua station as city of origin, it would seem as if the latter people brought the Nahua element into Mayan civilization.²

From the Nahua Records of or Annals of

² The Mayans claimed to have a small number of ancestors from the sunrise sea and a large number from the west, when asked concerning same at the time of the conquest.

The Tutul Xius, as some authorities have noted, give the Nahua name of Nonoual as a place of origin. Among other manuscripts this is given as a Nahua tribal name for the last group to leave Tollan.

¹ At present the pyramid has a church built upon its earthen cover.

Ixtlilxochitl,³ the documents of Brasseur, Mendieta, Torquemada, Gomara and others, we have some decided similarities to the Popul Vuh. It is these similarities which must be regarded as the true historical echoes behind the symbolism and the allegory.

According to the racial memories of the Nahuas, their homeland was Huehue Tlapallan, which is to be translated as "Old-old Sun Land" or "Old-old Red Land." It had not been their original homeland for they had migrated to it at one time, that migration having taken place both by land and sea, yet of that old migration they retained almost no memory. They only knew that from Huehue Tlapallan they could look out upon the sea where The-Sun-First-Arose-to-Illuminate-the-World. (Does this mean that the First Sun Empire was an island empire?)

Whether they had an unsuccessful war with an invader, or an unsuccessful revolt in Huehue Tlapallan, the result was the same. The Nahua Tribes had to leave their homeland as they found conditions to be intolerable. (It is the belief of the present writer that here is an interesting confusion. An early migration because of an invasion is distinctly confused with a later unsuccessful revolt of the sacrificing priesthood against the growing power of the new religion of the Great Reformer in Tula. In fact, most of the contradictions of the Popul Vuh arise from later revisions by this priesthood to make the narrative fit their own religious struggles.)

HAVING left Huehue Tlapallan, the tribes gathered at a place some distance east of the ancient capital for a council. At this council a great sage arose named Hueman. We have naturally thought of this land across the Western Sea as Asia or some obscure spot in America over a large body of water perhaps, but with this name comes our first real clue as to the locality. Hueman is strikingly close to Hanaman, the great Monkey-god who bore Rama and Sita away from an Aryan-defeated India. Furthermore, Hanaman is usually pictured with his breast open, revealing his heart. Later, Hueman, or Huemac (the Tezcatlipoca of the Aztecs), who contested city after city with the non-sacrificing Quetzalcoatl, in the war of the religions, was the god to whom they tore out living human hearts.

Returning to Hueman, the ancient one, in Huehue Tlapallan, he arose and advised some of the tribes to remain behind, and in a future generation to try and regain their homeland. Yet

to those who wished to go, he advised an eastern journey. He had sound reasons and in them, seems to lie a long-awaited key. He recalled for them that once their enemies the Quinames had been considered invincible in their eastern land. That, however, was before the Great Flood. This tremendous disaster had not only wrecked and submerged the Quiname homeland, but even inundated most of the Quiname colonies along the shores of the eastern land. The tribes need no longer fear the vengeance of the Quinames, or even of their fierce neighbors, the Chichimecs, since both had been drowned by the thousands.

He further recalled for the Nahuas, that every calamity they had endured had come upon the year Ce Tecpatl, when the Morning Star, which had always favored the Quinames, had been particularly powerful. However, once this period had passed, the Nahuas had recovered their strength and had gone on to new heights.⁴

In this broad and happy land, he urged, the Quinames had lived for many years, and though the year Ce Tecpatl would always be a threat, it was as yet many years before it could carry new disasters to the Nahuas. He urged them, therefore, to take advantage of this great calamity of the Flood, and the disastrous effect it had had upon the strength of these old rivals, by now seizing the eastern land.

In this old oration which echoes down to us from countless milleniums, we seem to see, not merely a religious struggle of the past two thousand years, but the ancient rivalry of two island empires, the most powerful of which had been crippled if not actually overthrown by a geographical catastrophe. Thus the basic elements of our picture are at last revealed—Easterners, Westerners and Natives or in their own terms—Quinames, Nahuas and Chichimecs.

It is the following Nahua migration which appears to be from west to east that all of the scholars have run into trouble. The trouble arises from their own preconceived ideas as to where the migration should start. In this confusion, the present writer was no exception. The only proper method was finally hit upon after much frustration. The Nahuas were placed at the end of their journey in Central America, where they were first definitely recorded at Tutul Xius. Then they were run backward to their origin. That origin proved to be the mystery of the Indian Ocean, or possibly the Coast of Java. Then many facts which up to then had but lain dormant, suddenly began to speak out loud. Such as the similarity between Hueman and Hanaman just mentioned; Bancroft's observation of the similarity in Nahua dress to that of the Malay; and the sudden realization that the descriptions of Nahua resting-places upon the famous migration, could easily be applied to islands.

³ Ixtlilxochitl was the descendant of an early reigning family in Mexico, who though Nahuas, were enemies of the empire of Montezuma. He was accused by Bancroft of carelessly copying what documents had survived the conquest, but it is the belief of the present writer that they may have survived only in a mutilated form. That he probably exaggerated the importance of his nation and name is undoubtedly true.

⁴ The fact that Cortez had landed in the year Ce Tecpatl had much to do with the fatalism with which the ancient Mexicans regarded his conquest as inevitable.

Although the method of travel is not designated, it is to be noted that they would travel for not less than twelve, and not more than twenty-eight days at a stretch, in actual movement. Then they would rest for several years, grow crops (repairing ships and constructing new ones) before continuing. They made twelve stops along the way, the thirteenth being their final destination. This, and the fact that they were traveling for one hundred and four years, or what they considered "an age," would seem that an attempt was made to keep the journey entirely calendrical, and that the calendar followed, in spite of what Hueman said, was that of the Venus Calendar, for it will immediately be seen that one hundred and four is eight times thirteen. Was Hueman's dislike of the Morning Star then to be laid to the fact that Quetzalcoatl had taken over to himself the calendar and power of that planet? And was this one of the points rewritten long afterward when the returning priesthood in their conclave of astronomers made out a new calendar?

As for the stops in this migration, they remained at each place not more than twenty-six years and not less than four, while the direction, with the exception of the last, which is given as northward, and after which they apparently disembarked upon the continent, taking the city of Tulancingo, "the City of the Seven Caves," is either specified as east or is not given.

Once the realization has taken root that the "Nahuas" of the Americas may have been the "Nagas" of India, it is also to be recalled that both names have a connotation of "Marvelous" or else "Mysteriously Powerful," though the old Serpent totem may have been dropped here because borne by their enemies, the Quinames.

Other names then leap to mind. Was the Central American volcano, Managua, which in Malayan means "Devourer," named by the Nahuas? And even more important still, was the Malayan name of "Maya" applied to that people of Central America after the advent of the Nahua Tutul Xius? And was the remaking of their calendar by the incoming Nahua priesthood what the Mayas by the incoming Nahua priesthood, what the Mayas mean when they refer to the "changing of the times."⁵

Were the copper-skinned, slightly-built, long-headed, dark-eyed Nagas of India, the people of

almost similar description (though long since mingled with the lighter-skinned, round-headed Asian and Amerind Chichimecs) who in the Americas, called themselves Nahuas? Were the Naga-Mayas, the reputed founders of earth's first civilization, also the founders of the last, and possibly also the next to the last, great Empire of the Sun? And before these two, was there another, in that southwestern ocean where, from Huehue Tlapallan, they could look out to where the Sun had First Arisen?

The Tutul Xius, say the old Mayan legends, had long and heated arguments with the Itzaes as to which people had the greatest antiquity of race and reason for pride in ancient ancestral achievement. To us, such an argument should have its humorous elements, for we have the unique privilege of sitting above the heat of the discussion (as it would be impossible to do if either the epoch, the state, or the ancestors were ours) and seeing at once the folly, since both were entirely right, and both were wrong. For behind the Itzaes stretch the millenniums of Quiname glory into those times Before-the-Flood, and back of the Tutul Xius stand the Nahuas. Even the Indian must smile in his quiet way for in his veins run both strains into an unknown antiquity.

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⁵ The Mayan date for the "Changing of the Times" is February 10, 176 A.D., suggesting that the Tutul Xiu came into power shortly before this date, and that the conclave of astronomers, of which many ancient books hold echoes, was held at this time. There is a great discrepancy, however, between this date and the supposed fall of Tula, the Magnificent, suggesting, perhaps, that the great city fell long after most of its hinterland.

Two other important dates to the Mayans are August 6, 613 B.C., and October 14, 3373 B.C., each of which is considered to be the beginning of an era. We have no idea why.

AN AIR PLANT

By
FRANCES YERXA

WE GENERALLY think that plants cannot move about because their roots are fastened into the ground and that they are fed by the earth. There are, however, some plants which manage to live and flourish without any earth at all. Such is the mistletoe, which grows upon trees, and is called a vegetable parasite. Some kinds of orchids are even more re-

markable, for they are perched like a bird on the branch of a tree. They have stems with broad green leaves and often beautiful blossoms; but their roots, instead of being fixed at the base of the plant, grow on the stems among the green leaves, and hang down into the air from which they gather the nourishment necessary for their life.

DR. HILSCH'S "WIRBELROHR"



By

ANTHONY B. OTT



IN THE APRIL issue of *Amazing Stories* we ran an article by Mr. Ott entitled *Maxwell's Demon*. It concerned a new device that our scientists were supposed to have uncovered in Germany after the war. It was simply a machine for producing heat and cold by means of a blast of compressed air—and nothing else! This article drew a host of letters into our office asking for further information on the mechanism. We relayed the letters to Mr. Ott and he answered most of them individually, pointing out that he had no further information available and referring the writers to the issue of *FORTUNE* magazine where the announcement of the existence of this almost magic machine appeared.

However, since then, Mr. Ott has obtained more material on the gadget and in the following article he describes it in greater detail.—Ed.

IN THE February issue of *The Review of Scientific Instruments* appears an article by Dr. R. Hilsch entitled "The Use of the Expansion of Gases in a Centrifugal Field as a Cooling Process."

This long-winded, typically German title conceals the details of an astounding device, a device so revolutionary in its operation that it appears a little short of magic. However in light of what Dr. Hilsch says it is now apparent that there is a simple, logical explanation of the operation of this machine. For the benefit of those who did not read the article "Maxwell's Demon" it would be well to briefly summarize what was said therein.

American scientists touring Germany after the war for the purpose of bringing back to America industrial secrets that would be of value to American manufacturers and scientists have come upon many interesting devices, among them, "Hilsch's Tuhe." The "Hilsch Tuhe" is nothing more than a group of three thin-walled metal tubes joined together in the shape of a "T." Into one of the arms a jet of compressed air from an air compressor or a blower is forced, and one of the other arms immediately becomes hot; the other becomes very cold. There are no moving parts and the entire operation is merely dependent on the shape of the interior of the tube.

As reported, a number of explanations were given to account for the way in which this deceptively simple apparatus worked. It was even thought that this was a realization of Maxwell's Demon, that mythical little being that could sort fast and slow moving molecules of gases. It is

evident now from Dr. Hilsch's article that the explanation is relatively simple.

Dr. Hilsch is not exactly the inventor of the machine but rather the developer, for his article starts out with an acknowledgement of the pioneer work in this field by M. G. Ranque whose work was announced in 1933, in the French Journal of Physics and Radiology. Nevertheless the fact remains that Dr. Hilsch has produced an ingenious device, one which is likely to be of great technical importance in the near future. Dr. Hilsch calls this machine a "vortex-tuhe" (in German, "Wirbelrohr") and that appears to be the best name for it because it almost describes what happens within the tube.

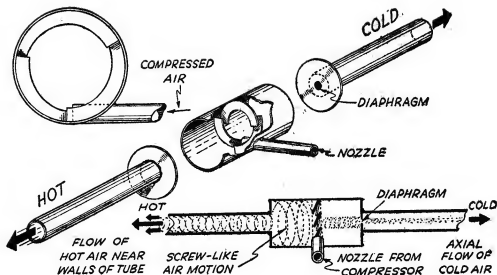
As can be seen from the accompanying illustration, the vortex tube is merely a T-shaped tube of metal into one arm of which air under pressure is forced. One arm gets hot; the other, cold. Nothing more than that. . . .

Dr. Hilsch's own words about the vortex-tube however leave us with the impression that even he who developed it in detail, is still startled by the fact that it works. It is a fundamental scientific principle that the fewer moving parts that a machine has the more efficient it will be. The best example of this is the transformer which has no moving parts at all. As a consequence it is almost 99% efficient, the only losses being heat losses. Dr. Hilsch says of his own vortex-tube:

"The demonstration of such a vortex-tube is simply astonishing. With proper choice of the physical dimensions of the tube, compressed air of a few atmospheres pressure and 20° C. will easily produce a temperature of plus 200° C. in the left tube and minus 50° C. in the right tube.

It is easy to see from those words that Dr. Hilsch is impressed with the fact that such a trivial system can be made to do such strange things. All you have to do is push air into a tube and you get both heat and cold from the other ends of it!

THIS is roughly what happens in the vortex-tube: compressed air is permitted to enter a metal tube tangentially from a nozzle placed to one side of it. A flow of gas takes place in the tube, in a turbulent, yet screw-like fashion, and escapes from the open ends of the tube. This stream of air, rotating, generates a place of increased pressure near the walls of the tube and a place of reduced pressure in the axis of the tube. If the opening of one end of the tube is decreased by a diaphragm which permits air to escape only from the axial region, while the



other arm of the tube is throttled, the air coming through the center of the diaphragm has a lowered temperature; the air from the throttled end, a higher temperature.

The vortex-tube is so simple in operation that it is difficult to understand why it hasn't been invented before. It seems that the study of air-flow as in aerodynamics, and rocketry, and jet-engine-study, has produced the knowledge necessary to devise this gadget, although Dr. Hilsch does not say where the French scientist, Ranque, got the idea.

In his original experiments, Hilsch made the tube of German silver, a metal which has relatively poor heat conductivity to prevent a transfer of heat between the hot and cold ends of the tube. Perhaps other metals with poorer heat conductivities would be preferable; in fact, it might be possible to make the tube of something besides metal—or maybe a combination of metal and other materials. While the scientific facts about the machine are known there is much opportunity to experiment and improve upon it.

For example: these things are known; in small sizes, the Hilsch-vortex-tube is not efficient and much of the energy of the compressed air is wasted. In very large sizes however it may be made quite efficient. Suppose for example, we had a vortex-tube a foot or two in

diameter instead of a few centimeters! Hilsch says that it is not likely that the vortex tube will be able to compete with conventional refrigerating machinery because of this matter of efficiency, but for some applications as in cooling on a large scale—mine shafts, for example—it would be valuable because it is such a simple thing.

Hilsch also mentions that he is still experimenting with the machine and that he will give further reports on it as soon as possible. It is also known that a number of large companies in the United States are interested in the gadget and they will undoubtedly do research upon it.

Because it is such a ridiculously simple machine, it should be possible for almost anyone who has access to simple hand tools to build one and make it operate. Yet it would probably be of no immediate practical value because of the limitations stated by Dr. Hilsch. But it would be interesting to construct a Hilsch vortex-tube, if only to see the practical realization of a theoretical idea.

Optimistically it was stated in the last article that there may have been the possibility of utilizing this gadget for heating and cooling a home. While now it doesn't seem as if this is going to come right away, it still is a possibility and certainly worthy of consideration.

NATURE'S EFFICIENCY

THE bee demonstrates the efficiency of Nature in the shape of the cells which make up its honey comb. These cells are invariably six-sided, and mathematicians say that this form provides the maximum of storage space with the use of the minimum amount of wax. Actually, even if the bee were to build round cells,

the weight of the surrounding cells full of honey would gradually force the curving sides into plane surfaces. Opposing pressures from all directions form the six-sided shape. The hexagon is present in Nature in many other forms, such as in the living cells of many animal and plant tissues.

Carter T. Wainwright

TUNNELS of the TITANS



By

VINCENT H. GADDIS



BELOW the surface of the earth, stretching for countless miles, lie the archaic tunnels of the Old Ones. Cut in the primal rock by methods unknown, they turn and twist in a complex labyrinth, shrouded in the darkness of the ages, their walls blackened by an incredible antiquity. It is true! Long, long ago, their very existence forgotten in the rise and fall of empires and the surging migrations and passings of peoples during the long centuries, there lived a mighty race of subterranean builders who wrought wonders in stone.

Here and there we can catch a glimpse of the mysterious realm hidden below our feet that they left behind them. There are the artificial caves of Malta, huilt "at a period when history is all mystery," which lie below the puzzling so-called "cart-ruts" that crisscross the island in every direction, and terminate on the brink of cliffs or lead directly into the sea. There is the elusive North African-Gibraltar tunnel, and the half-legendary connecting links between the islands of Hawaii that were known to the native kings and *kahunas* of old. Martinique, too, has its lost prehistoric shafts, and Tecpan in Guatemala, and Agra in India. In the heart of Central Asia, Dr. Ossendowski tells of Agharti, and Prof. Roerich awaits the coming of Maitreya, Lord of the New Era, from concealed Shamhhala.

But it is in South America, past hoary Tiahuanacu, from the crumbling monuments of old Cuzco to the weird desert of Atacama, below the soil on which the Incas honored the sun and fell before Pizarro and his greed-crazed conquistadores, that our survey of the tunnels of the long-gone Titans assumes its most interesting and concrete picture. Hundreds of miles in length, these astonishing sub-surface avenues have been used in historical times, and may conceal much of the lost treasure on the Incas. But who can say how much greater wealth—relics of dim millenniums and beings who have passed away like wisps in a dream—awaits the eyes of tomorrow's explorers.

Who were these Titans, the Old Ones, of earth's youth—Lords of the Flame who inspired tradi-

tions of great airships—giants who transported colossal stones weighing tons hundreds of miles to erect structures "half as old as time"? With what strange tools did they cut the endless roads deep in the heart of our planet's rocky foundation? Who can say?

There are the legends of Atlantis, Mu, Lemuria, and the even more mysterious continent of the southern seas—Gondwanaland. The ancient lore of Asia tells us that old Atlantis had a network of cyclopean underground passages running in all directions that were used for black magical purposes, and that colonies were established by the Atlanteans in many parts of the world.

And in the America to our south a great civilization once flourished, a culture of bearded white men, believed to have come from the east. They huilt great cities along the inland rivers that now lie in silent ruins deep in the green hell of the jungles. But from the north came the Colloas, a pre-Inca race, and in a battle on an island in Lake Titicaca they killed the last survivors of America's prehistoric white race.

Even earlier there was another culture, haffling, remote, incredibly aged, and linked with strange traditions of antediluvian giants. Arriving, apparently, from the west, these artisans of a dawn era huilt old Tiahuanacu. Perhaps, too, they huilt the tunnels. Then, later, came the titanic cataclysms that rocked the earth in agony and left its mark in the memories of all earth's races. The mountains were raised, and the continents, to the east and to the west, were swallowed beneath the seas.

Building upon the mute remains of massive masonry that had been erected by a previous race in America's puzzling and confusing past, the Incas established their civilization along the western coast of South America. A culture of peace and socialistic idealism, with the symbol of the sun denoting their conception of spiritual realities, they tended their fields and huilt their homes and temples in quiet, gentle contentment. There was little crime among the Incas—a man could leave his possessions openly with safety, and gold was not a medium of exchange, but an element for artistic ornamentation.

Then, in the sixteenth century, came Don Francisco Pizarro and his cruel, gold-mad Spanish conquistadores. They seized Atahualpha, last of the Inca emperors of the sun, and promised to release him upon receiving a ransom—gold that would fill a room seventeen by twenty feet, and nine feet in height. It is estimated that this ransom consisted of 600 tons of gold and jewels with a cur-

Note: The material on the Atlantean "Subterranean" or South American tunnels contained in this article is copyrighted by Harold T. Wilkins, author of "Mysteries of Ancient South America (Rider and Co., London, 1945), and is used by special arrangement. Based upon extensive research in old Spanish, British and American archives, an American edition of this remarkable book is being prepared.

rent value of 835 million dollars. While awaiting the ransom, which was to be collected within three days, the conquistadores busied themselves stripping the gold-plating and water pipes from the Cuzco temple walls.

Then the gold flowed in, arriving by caravans from various parts of the empire. Dazzled by the ever-growing display of boundless wealth, Pizarro demanded to know of the source, and it is said "that he had heard that the Incas possessed a secret and inexhaustible mine, or enormous depository of mysterious character, which lay in a vast, subterranean tunnel or road, running many miles underground beneath his imperial dominions. Here was kept the accumulated wealth of the country" (Wilkins). In return for this knowledge, Pizarro would give the emperor his freedom.

But Pizarro had now broken his first promise. The Inca queen decided to consult the oracles of the priests of the sun, and by a mystical means, a method of scrying said to have come from old Egypt, she learned that whether the secret was given to Pizarro or not, the emperor was doomed. Orders were issued. Under the direction of the high priest, the entrance to the great tunnel was sealed and hidden from view.

Beneath the brilliant light of a great comet that gleamed in the southern skies at this time, the empire of the children of the sun came to its tragic end. Atahualpa was strangled and his queen committed suicide. As news of the emperor's death spread through the empire, caravans, en route to Pizarro's camp near Cuzco with treasure for their ruler's ransom, stopped and quickly buried their burdens. All the wealth of the Incas rapidly went underground.

ONLY a few decades later, Cieza de Leon wrote: "If, when the Spaniards entered Cuzco they had not . . . so soon executed their cruelty in putting Atahualpa to death, I do not know how many great ships would have been required to bring such treasures to old Spain, as is now lost in the bowels of the earth and will remain so because those who buried it are now dead."

And where are these Inca caches? Concealed in fortress vaults, hidden in forests and under hills, and sealed in caves "to which mystic hieroglyphs whose key is possessed by one descendant of the Inca, at a time, in each generation, give the open sesame, and in strange 'subterraneans,' thousands of years old, which must have been made by a mysterious and highly civilized vanished race of South America in a day when the ancient Peruvians, themselves, were a mere wandering tribe of barbarians . . . or still living, perhaps, in some long-disrupted Pacific continent, from which they came in ships" (Wilkins).

A few of these caches have been found in the four centuries that have elapsed since those cruel, bloody days, but the primary source of Inca wealth remains locked within the earth. The Quichua Indians of today are the direct descend-

ants of the Incas of old, and their traditions insist that in each generation one, perhaps two, of their number, unknown to the rest, possess the ancient secret. Fifteen years after the conquest of Peru, they told the soldier-priest, Cieza de Leon, that "the treasure is so concealed that even we, ourselves, know not the hiding place."

Today the Quichuas, down-trodden and melancholy, remember with fanatical devotion the grandeur of their ancestral past, and they dream of a tomorrow when the old glories shall return, and when, with reincarnated leaders, the empire of the sun will again raise its shining banners beneath Andean skies. Against this day, they preserve their secrets, and dream. . . .

With eternal vigilance they watch the treasure hunters. Any large-scale attempt to locate the ancient tunnels would almost certainly start a revolution and, as we shall see, only a great undertaking, with government support, would be successful. It is to be regretted that the archaic tunnels were used as a depository for Inca wealth, for now, due to the brutality of the conquistadores, they are cut off from modern archaeological investigation.

IN 1830 the Peruvian authorities picked up rumors of the existence of the tunnels, and sent out investigators, posing as scientists, among the natives, but this official attempt to obtain additional information or locate the concealed opening failed and was finally abandoned.

About fifteen years later an old native priest was called to hear the final confession of a dying Quichua Indian, one of the descendants of the Incas who possessed the long-kept secret. Under the seal of the confessional, the dying man told his priest of the astonishing tunnels, used by the Incas, but built by a far older race. Later this priest, carelessly, let fall a hint regarding his knowledge, and was forced, by trickery on the part of an Italian traveler, to state what information he possessed.

Then, about the year 1850, Mme. Helena Blavatsky, the Russo-American founder of the Theosophical Society, came to Peru. With her worldwide reputation as a mystic and student of ancient lore, she was able to pick up various bits of information on the old Inca mystery, and in Lima she met the Italian traveler who had forced the priest to reveal what he knew. The Italian said that he thought he had found one of the tunnel openings but, lacking time and funds for an investigation, he had no immediate plans for forcing an entrance.

Later, leaving Lima, Mme. Blavatsky traveled south. She writes: "We reached Arica, near sunset, and at a certain point on the lovely coast we were struck by the appearance of an enormous rock, nearly perpendicular, which stood in mournful solitude on that shore, and apart from the cordillera of the Andes. As the last rays of the setting sun strike the face of the rock, one can

make out, with an ordinary opera glass, curious hieroglyphics inscribed on the volcanic surface."

This rock, known as the "Tomh of the Inca," is at Ylo, northwest of Arica, on the shore. It is cut with ancient hieroglyphs which are said to reveal the key to the secret entrance to the tunnels, which, in turn, is located somewhere near the *Los Tres Picos* (The Three Peaks) further inland. These oddly-shaped, separate peaks form a curious triangle, and lie near the Rio de Loa, a river which marked the former Peru-Bolivian boundary. But the strange peaks guard well their secret, and who can decipher the puzzling inscription, visible only when the sun is at a certain angle, and carved so long ago?

Likewise, according to Mme. Blavatsky, the secret of the tunnels and the entrances into them were given in symbolized form in the old Sun Temple at Cuzco, and some of this knowledge still exists. As Mr. Wilkins remarks, the old priestly corps of the Incas may have possessed "much curious and secret knowledge about the origin, history and purpose of the amazing, labyrinthine tunnels of ancient Peru, and of other arcana of a very ancient race."

Two charts of the tunnels are known to be in existence. One was obtained by Mme. Blavatsky from an old Peruvian at the time of her visit, and it is now in the archives of the Theosophical Society headquarters at Adyar, India; the second, based upon his independent sources of Peruvian information and checked by his own inquiries and research, is in the possession of Mr. Wilkins.

This latter chart, a copy of which lies before me, reveals that two subterranean avenues start from Lima. The first leads to Cuzco, to the southeast, a distance of 380 miles. The second, running southward along the coast to the Atacama Desert, covers the astonishing distance of at least 900 miles—greater than the distance from New York City to Chicago.

SOMEWHERE near Cuzco lies one of the openings, but it is "masked beyond discovery." The southern terminus of the second is lost in the salty, alkaline waste of the Atacama, in northern Chili, itself an area of mystery, while along its route another concealed entrance, previously referred to, lies somewhere in or near The Three Peaks. This latter opening is to the southwest of Lake Titicaca and Tiahuanacu.

In addition there apparently exists an extension of the tunnels east of Cuzco, through which Tupac Amaru, the Inca leader, with forty thousand soldiers and refugees, in 1533, escaped into the forests from Pizarro and his conquistadores, this route leading into the unexplored jungle territory of northern Bolivia. In 1850, about the time Mme. Blavatsky was gathering her information, the government of Bolivia, like Peru some twenty years earlier, heard rumors about the tunnels and quietly sent out investigators, but all in vain!

L. Taylor Hansen has recently told us of the amazing Apache tradition that links them with

Tiahuanacu, and the great tunnels in that area. He tells us that the Indians of Peru have legends that "caves" in the region held most of the real city ("very little of it was built above ground"), and that the Apache story states that after their ancestors were driven out by enemies that they left by way of the caverns, and wandered "through them in darkness for years." It is an amazing possibility that the very tunnels used by the ancient ancestors of the Apaches were again used for the very same purpose by Tupac Amaru and his Incas in the sixteenth century—only four hundred years ago!

We return, also, to the previously published report in this magazine, from Peru, that after every earthquake there puzzling sounds are heard—"sounds that are startlingly like the sound of huge boulders falling far under the surface of the earth . . . distinctly classified as falling objects, as stones falling from the roof of a cave to the floor. . . . It is said that the falling rocks are heard as much as twenty minutes after the quake itself, and that a hollow booming noise is a very dominant characteristic."

Later races, using these passages as royal tombs to be protected from robbers or as depositories for treasure, have contributed to their concealment, and surrounded them with an aura of occult mystery that the modern archaeologist cannot penetrate. Moreover, the damages inflicted by earthquakes in these later centuries must be considered. That there exist other reasons, more subtle and amazing, for secrecy is a very real possibility.

The remarkable traditions of ancient tunnels that we inherit from the older worlds of Europe, Asia and Africa cannot be ignored, and more than mere tradition supports their existence. Herodotus, for example, tells us of a very mysterious labyrinth, known and used by the ancient kings but built far before even their prehistoric time, that he observed on or near Lake Moeris, of the Western Nile. It has since vanished from the ken of man.

Then there is the suhterannean mystery of the island of Malta—

Paul Wilstach, in his book *Islands of the Mediterranean*, writes of the astonishing remains that date back to a period where history is all mystery. Crisscrossing across the surface of the island are the parallel "cart-ruts," from four to six inches wide, and cut as deep as eight inches into the rock. Some end on the brink of cliffs; others lead to the sea, disappearing under the water, and examples have been observed where, after being interrupted by a geological fault, they continue on another level. Obviously they were made by huge wheels in an era when the island was larger or a part of the mainland, and their extreme age is indicated by the fact that several appear below a tomb of the Phoenician period.

Below these ruts that "scarred the island in days at least very near the Deluge," and, mysteriously, have no signs of wear between them, is

the subterranean structure known as the Hypogaeum of Hal Saffien, near Valetta, where "there is unusualness and mystery enough to arouse even a Philistine's awe." Cut deep into the island's foundation rock, it consists of a series of chambers on three levels. At one point there is a funnel-shaped pit that drops to unknown depths. No suggestion as to their original purpose can be found.

Wilstach writes: "One does not wander below the surface of the earth, through architected excavations, with tapers which obscure as much as they reveal . . . without a memorable effect. One does not return to the reality of sunlight without an accentuated sense of a remoteness extending into the twilight of the race."

To the west of Malta, at the gates to the Mediterranean, lies the Rock of Gibraltar, scene of a half-legendary tunnel by which the Barbary apes travel back and forth from Africa to Spain. There is no doubt that the apes, in some mysterious manner, make the trip, for they have been tagged and kept track of, but no tunnel openings have yet been found. On the other hand, it must be remembered that the famous rock contains over thirty miles of galleries. The mystery has often been discussed in histories and accounts of Gibraltar, and naturalists, like Dr. Raymond L. Ditmars, have puzzled over the matter. North Africa, itself, home of the blood-drinking Troglodytes who lived underground (see *The Martyrdom of Man*, by Winwood Reade), is the scene of many cave legends.

A book could be filled with accounts of the strange appearance of animals far from their usual habitats that clearly indicate unknown transportation means that might include tunnels. This is particularly true of sea animals and their appearance in inland lakes. An outstanding example of such occurrences is the unexplained appearance of thousands of branded reindeer on the far-northern island of Spitzbergen for over a century, a problem that has caused much speculation in Norway and England.

ALONG the western edge of California's famed Death Valley lie the bleak and lovely Panamint mountains, scene of a strange tale of a lost, underground city containing great wealth. Even today roamers are still searching for the elusive shaft somewhere near Wingate Pass that will lead them to a subterranean realm filled with mummies and gold. The interested reader will find most of the story in Bourke Lee's *Death Valley Men*.

In the old days the Painte Indians, living in that locality, had a legend of a chief who entered a cave and found himself in the world of the dead, a story that was recorded by the famous American ethnologist, J. W. Powell. But later another Indian, the grandfather of Tom Wilson, now a well-known Panamint guide, disappeared for three years and returned to tell of entering a cave, wandering for many miles and finally finding himself in a strange underground country where the

inhabitants, very much alive, spoke a strange language, ate queer food, and wore clothes made of leather.

Then, about twenty years ago, a prospector named White, appeared with another tale. He told desert rats that while working on the bottom of an old abandoned mine shaft, the ground suddenly gave way beneath his feet, and he fell into a tunnel. Curious, he followed the tunnel for some distance, and suddenly entered a vast cavern city. It was a realm of the dead. Hundreds of mummified bodies, indicating that death had come suddenly and mysteriously to its dwellers, sat in chairs beside huge stone tables or lay silent upon the rocky floors. The bodies were clothed in leather aprons, large gold statues stood here and there and the cavern was oddly illuminated.

Unable, apparently, to find his way back to the shaft and the city, the prospector's vast spread rapidly and a number of large searching parties were formed. The mountains were carefully combed. One shaft located in a rather unusual spot was found, but its bottom was solid. And despite the fact that many outstanding Death Valley characters were drawn into the hunt, it ended in failure.

It is said that when John Thorndike, a well-known prospector, returned from the search disappointed, the even more famous Death Valley Scotty was waiting for him. "I could take you right to the place," Scotty told his friend. Of course, Scotty may have been kidding, but from his own secret mine, which has never been described, he has produced a fortune of close to three million dollars.

Turning now from the hot, sandy wastes of the desert to far, green Hawaii, again we find the stories of tunnels. Old native legends tell of lost, prehistoric tunnels, known to the kings and *kahunas* long ago, which connected the islands by under-sea passages. These shafts play quite a part in native folklore and may date back to Lemuria or Mu.

Material relating to these tunnels is embodied in a novel entitled *Healing Under Tropical Skies*, written by Evelyn Whitell in 1938. She suggests that these tunnels are still in existence, and that even today, the secret of a favored few, the old lore has not perished.

IT IS in Central Asia, however, that we reach the climax of tunnel tradition. Although, in a previous article, we referred to the mysterious story of Agharti, the full extent of the report has not been told. In more recent years Nicholas Roerich, famous artist and orientalist, has added the weight of his authority to this story of a subterranean kingdom, reached by shafts hundreds of miles in length, that he call Shambhala. And from this realm he expects Maitreya, the Lord of a New Era in earth's long history, to emerge and bring order out of the chaos of our times.

Deep and puzzling indeed are these recurrent and never-dying rumors that drift from the Hima-

layas, and from which James Hilton created his *Shangri-La* in his novel *Lost Horizon*. Where so much smoke emerges, a strange fire must burn, and Theodore Ilion's observation of the astonishing shaft in Tibet only increases our wonder.

Harold T. Wilkins tells us of an ancient Hindu tradition that refers to a large island of great beauty which, long ago, existed in the middle of a large inland sea in Central Asia. Perhaps it is the former Gobi Sea (now a desert) that is meant, for it was to a city along its shore, according to another ancient legend, that visitors from the planet Venus arrived in great space ships and taught early man many important things. At any rate, the location of this sea was given as "north of the Himalayas," and on this island dwelt great men of a golden age, a race of nephilim.

Between this island-city and the mainland radiated huge tunnels in all directions, many hundreds of miles in length. It is said that hidden entrances to these tunnels existed, and may still exist, in the older, now ruined cities in India, and also at Ellore, Elephanta, and the Ajunta caverns located in the Chandore range.

It is a matter of record that beneath the fortress and adjoining structures built by the great Moghuls at Agra, India, lie vast subterranean vaults and passages, of great but unknown extent. For reasons that are not clear, these parts of the buildings were closed, and they have been sealed now for long centuries.

Various names have been applied to underground realms in Asia, and there may well be more than one of them. Agharti, the term used by tribes in Inner Mongolia as reported by Dr. Ferdinand Ossendowski (see his book *Beasts, Men and Gods*), is said to be a world of antediluvian descent, incredibly aged, and located in a recess in the vicinity of Afghanistan. But it is linked by amazing tunnels to other such regions in many parts of the world.

As Mr. Wilkins comments: "Tibetan lamas even assert that in America there live in vast caves of an underworld, reached by secret tunnels, peoples of an ancient world who thus escaped a tremendous cataclysm of thousands of years ago." The lamas say too that in both Asia and America these realms are under the control of benevolent rulers or king-archons, and that they are illuminated by a strange green luminescence which is conducive to the growth of plant life and greatly lengthens human life.

Dr. Ossendowski, who obtained his information during his flight from Russia to China in 1920-21, writes that the dwellers along the Amyl River say that a certain Monogolian tribe, escaping from the terror of Jenghiz Khan and his borders, disappeared into Agharti, and that one of the entrances is supposed to be near the Lake of Nogan Kul. He adds that Agharti is "not only a mystery, but a realistic and powerful force capable of influencing the course of the political life of the continent of Asia."

AGHARTI began some sixty thousand years ago when a Holyman, together with a whole tribe of people, vanished underground. Science has been greatly developed, and there is no crime. Its inhabitants, now numbering millions, travel in cars that rush through the passages at tremendous speeds.

Prince Chultun Beyli, of Mongolia, told Dr. Ossendowski that this underground realm "extends throughout all the subterranean passages of the whole world. I heard a learned lama of China relating to Bogdo Khan that all the subterranean caves of America are inhabited by the ancient people who have disappeared underground. Traces of them are still found on the surface of the land. These subterranean peoples and spaces are governed by rulers owing allegiance to the King of the World."

"You know," the Prince continued, "that in the two greatest oceans of the east and the west there were formerly two continents. They disappeared under the water, but their people went into the subterranean kingdom. In underground caves there exists a peculiar light which affords growth to the grains and vegetables, and long life without disease to the people. There are many different peoples and many different tribes."

It is apparent from these accounts that Agharti, far from being merely an isolated underground city of Asia, is a vast world-wide domain. It has a capital city surrounded by towns of high priests and scientists. And the agents of the ruler, who control all the forces and powers of nature and science, are called the Goro.

But there is one thing even stranger. It was told to Dr. Ossendowski by the Lama Turgut while they were traveling together from Urga to Peking. He said: "Sometimes the most learned among them (the Goro) send envoys to that place where the human eyes have never penetrated . . . (they) place their hands on their eyes and at the base of the brain of younger ones and force them into a deep sleep, wash their bodies with an infusion of grass and make them immune to pain and harder than stones, wrap them in magic cloths, bind them, and then pray . . . The petrified youths lie with eyes and ears open and alert, seeing, hearing and remembering everything . . . very slowly the bodies lift themselves from the earth and disappear."

"The Goro sits and stares with fixed eyes to the place whither he has sent them. Invisible threads join them to his will. Some of them course among the stars, observe their events, their unknown peoples, their life and their laws . . . In Erdeni Dzu formerly lived Pandito Hutuktu, who had come from Agharti. As he was dying, he told me about the time when he lived according to the will of the Goro on a red star in the east, floated in the ice-covered ocean, and flew among the stormy fires in the depths of the earth."

Strange indeed are the ways of Agharti. And these are the accounts heard by Dr. Ossendowski in Lamaite monasteries, in the palaces of Mon-

golian princes, and on the vast Siberian plains. Told with a solemn conviction, often with fear, they "forbade challenge and doubt." How much is fact, and how much is fantasy? What strange truth may lie behind this widespread belief that grips tightly the very heart of Asia?

We grope toward an understanding of the great mysteries by seeking clues, however slender, however vague, and by linking together reports and events, and seeking a correlation. We have told of the amazing tunnels of ancient Peru, used by the Incas but built by a far earlier race, and now the story of Agharti has been told. And the miles are long between the Andes and the highland of Tibet. . . .

Nevertheless, a few years ago, a strange rumor began to circulate through the occult world. Briefly, it was that the 13th Dalai Lama was not lying in a crypt in Tibet after his supposed death in 1933, but that he had retreated to a sanctuary in the Andes. In Lhasa he had left a pretender to succeed him, the six-year-old Tibetan peasant lad crowned in 1940.

Supporting this report was an American yogi who had spent five years with the Lamas of Tibet, and who asserted that the Dalai Lama, foreseeing coming trouble in Asia, had preferred to disappear rather than become involved in the turmoil. Also, there was the late Brown Landone, who, in his book *The Prophecies of Melchizedek*, expressed the belief that Lamaism had its origin in the Andes, and that Teleo's Circle prophecies in Egypt foretold the return of the Dalai Lama from Tibet to the order's original home in a far

land.

Then, in February, 1944, J. M. Sheppard, the *American Weekly* correspondent in Ecuador, cabled a story that added weight to the rumor. He told of meeting an American hermit who lives in the Ecuadorian highlands, and who, while climbing a mountain near the Colombian border to investigate strange lights he had been observing at night, was startled by the fall of a heavy boulder. Then a man appeared, garbed as a Quichua Indian, but with Mongolian facial features, and a prayer wheel in his hand. The hermit was politely, but firmly, told, in English, that he must go no further, and he was requested to respect the privacy of a holy man.

Sheppard decided to confirm the story, and following a map given him by the hermit, he located the mountain, and started climbing. Near the top he noticed a jagged hole, almost circular, that looked like the eye of a needle piercing the mountain's peak. Then, again, came the crash of a boulder, and the arrival of the mysterious man. This time the stranger spoke in Spanish, but he refused to answer any questions, and again insisted on privacy.

On this slender clue hinges the possibility that there may be a connection between Tibet and the Andes, and, perhaps, between Agharti and the archaic tunnels of South America. That great builders of tunnels once existed on this planet, we may be certain, but is it possible that these vast avenues are in use today—that there is a flow of unsuspected life far below our feet? Who can say?

THE MOON'S ATMOSPHERE

By

GEORGE RODGER LOISELLE

★

AS FAR back as the time when man no longer considered the celestial bodies as gods, the subject of the exploration of the moon's surface has been in his mind. It has been so deeply imbedded in man's imagination that all our great minds have pondered on it, some philosophers have advanced theories concerning it and many of our fictionists have visualized in many a bewitching tale, hypothetical inhabitants of the moon. Some of our greatest are: Jules Verne, Franz Gruithuisen, and Camille Flammarion who have expounded the thought and, by so doing, have brought the view of its possibility before the public. Cooperating with scientists by stipulating the misfortunes of a trip to the moon, they have transcended our line of reasoning within the reality of our small sphere.

The purpose of this article is to present my theory concerning the possibility of the Moon's having an atmosphere. Scientists, theorists and most fictionists believe that habitation of the Moon, without artificial means, is impossible. This belief is well-founded on the results of spec-

troscopic analysis and the compilation of data obtained by astronomers over a period of many decades. BUT we see only one side of the Moon because it makes only one revolution about its own axis during the time it makes one revolution around the Earth. This article, I believe, will be enjoyed by those who like their reading substantiated by logical argument. Therefore, I will endeavor to proceed in a logical way which can be understood by the laymen as well as by those who are better versed in mathematical analysis. After you have read the article, try to visualize the operation of the phenomena discussed. I do not reject any standing theories concerning the Moon's not having an atmosphere but since we see only one side of the Moon, we must deduce the nature of the opposite side in the following manner.

Suppose we begin by taking into consideration the velocity at which the Moon travels in respect to the Earth. We know it takes twenty-seven days, seven and seventy-two hundredths hours (27 days, 7.72 hours) for the Moon to make one complete revolution around the Earth. We know,



also, that the distance from the center of the Earth to the center of the Moon is 238,857 miles. We are going to speak in large figures but with a broad, analytic view a person can visualize two spheres, one representing the Earth and the other the Moon, connected by a string whose length is the above immense figure. The smaller sphere revolves around the larger and travels in the orbit, taking 27 days—7.72 hours to make one revolution. The distance traveled is the circumference of that circle whose radius is 238,857 miles. Applying our school mathematics we can compute the circumference which is the distance traveled in 27 days—7.72 hours, by multiplying two times pi (π) times 238,857 miles, in which pi is the number 3.14159 Beating my head against the wall, trying to remember my multiplication tables, I finally arrive at the result: the distance travelled is, roughly, 750,390 miles. Now, since each day has twenty-four hours and it requires 27 days and 7.72 hours for the Moon to make this trip, then the number of hours necessary is 27 times 24 plus 7.72, or 655.72 hours. In order to find how far the Moon travels in one hour, all we need do is divide 750,390 miles by 655.72 hours, obtaining nearly 1144.376 miles per hour which is also its velocity.

Having established the rate of motion of the Moon in its orbit, we may compute the force exerted by this centrifugal motion by means of the equation:

$$f = \frac{m v^2}{r}$$

in which, M —is the mass in grams, v —is the velocity in centimeters per second, r —is the radius of the circle in which the Moon moves, and F —is the force in dynes.

Now do you remember the formula? You have probably come across it at one time or another.

Well, let's jump in and compute it. First we have the elements: m —which is the Moon's mass, giving 1.866×10^{23} tons or, to put it in my language, it is six sextillion tons divided by 32.16 (the gravitation constant).

Multiply 1.866×10^{23} by 0.01288 will give us m , the Moon's mass, which, in grams is 2.078×10^{27} grams. This is the figure 2078 followed by twenty-four zeros. We have already established v , the velocity, as 1144.376 miles per hour and the radius, r , we already know is 238,857 miles. These elements (velocity and radius) must be converted into absolute units giving:

$m = \text{Moon's mass} = 2.078 \times 10^{27}$ grams.

$v = \text{Moon's velocity} = 50,880$ centimeters per second.

$r = \text{radius} = 3.844 \times 10^{10}$ centimeters.

Now we may solve the force equation:

$$f = \frac{2.078 \times 10^{27} \times 50,880^2}{3.844 \times 10^{10}} = 2.612 \times 10^{22} \text{ dynes.}$$

Since one dyne is equal to one-nine hundred eighty firsts of one gram (1 dyne = 1 gram \div 981), and since one kilogram is equal to 2.205 pounds and since 2000 pounds is equal to one ton, then this force of 2.612×10^{22} dynes can be resolved to a force of twenty-nine trillion, three hundred billion tons (29,300,000,000,000 tons). This terrific force is exerted on the Moon and its atmosphere.

This logical reasoning has the basis of mathematical fact but as in all theories there is room for research and debate. There has been a lot of conversation about dynes, grams and such, which all boils down to one point: the Moon, traveling at its velocity, creates a terrific centrifugal force which causes the atmosphere to accumulate on the opposite side of the Moon from us where, of course, our instruments cannot detect it.

THE MAGIC OF MADALER



By

BATTELL LOOMIS



HERE'S a stumper for the Quiz Kids. Who landed a monoplane, weighing 380 pounds, in 1911-13 blindfolded and with his arms crouded? It was a 38-year-old Austrian in England by the name of Ferdinand von Madaler, the "von" indicating him a noble with the rank of count. He built the plane and flew it two years. He invented the gnome rotary motor and sold it to France for 50,000 francs, but did he get the 50,000 francs, dear children? He did not, because half of it stuck as grease on the palm of an adjutant to Bertold, the minister. What he got was worth \$5,000.00.

He invented the staff shell and literally gave it

to France. When, in 1906, he left Paris for London, he improved the shell and gave it to Britain. Here he found the government to be composed of "shentlemen," because they voted and paid him 2,500 pounds for the shell. While making delivery of six loaded shells, in a light car with his Hungarian wife and their second son, a baby born in London, he had to rise a kerf to avoid hitting a baby carriage. The car overturned and spilled the shells in the street. None exploded. No one was hurt.

Now, let's begin at the beginning. Madaler (It sounds like "my dollar" in its American usage) was born October 16, 1873, at St. Polten, a subur-

ban town of Vienna. Educated at Heidelberg, where he received his degree as a master of mechanical engineering, he naturally approached the German government with his first invention in 1893, a range-finder for heavy artillery. He was promised 50,000 marks, if it worked. It did work and the German promise proved valid to the amount of \$1, invested for him in a small silver cross. Overcome with this honor, he left Germany in a hurry and has never returned. He lost the honorarium. He was enabled to leave by the devise to him of a fairly large sum of money, that he used first to visit Russia, then to tour the world, finally returning to Vienna, the Balkan states and Constantinople. He met his wife in Budapest. She holds the English patent on the idea of running sound beside film. Their first son, Otto de Madaler, uses the "de" because he was born in Paris. The second, London-born, son was "of" Madaler, but is dead and the Long Island-born daughter is plain Madaler—a cosmopolitan family.

Madaler holds a Budapest patent, dated 1899, for the first diamond point and hill and dale disc phonograph recorder. He established a business there, making records, but sold out and removed to Italy, where he established another business at Milano, selling that and going to Paris in 1905. He had a fight with Edison over the invention of the recorder. The Edison dry-cell battery was invented by one of Edison's workmen, spurred by a shop order to produce one. He received a \$25 bonus. Madaler knew Sir Hiram Maxim in London but on being permitted to leave England for America, when the war broke in 1914, he did not make the acquaintance in Brooklyn of Maxim's equally fantastic brother, Hudson, who blew off his right hand by holding a stick of high explosive while lighting it with a match. Maxim also passed through a brick wall without becoming a ghost. The wall preceded him by a few inches.

Madaler further improved the star shell and gave it to the U. S. Government, that accepted it as a gift in time of war in 1917. At Hampton Bays, L. I., he established the Selenium Laboratories, where for 10 years he made all the telephoto cells used by General Electric and the vitaphone machine.

In September, 1928, he sold the talking picture devices he had invented the year previous to four men who did him out of it, paying nothing. For forty years he worked on the invention of a magnetic motor, taking its power directly from earth's magnetic currents. In 1942 he got it. His model has been running continuously ever since, stopping only once to win him a \$5 bet when a scientist who had been taught to disbelieve in perpetual motion, bet he could stop it. He stopped it, and it started again of its own magnetic nature. Madaler showed a 25-pound model of this device at Griffiths Observatory. It is a can filled with secret metal filings, depending from a central support from which axis it rotates back and forth,

sometimes nearly stopping, never doing so. Sometimes it makes a 180 degree swing about. By equipping it with two ratchet gears to take advantage of its motion in either direction, it will run machinery in proportion to its weight.

In 1923 he had invented another perpetuum, consisting of chloroform in a glass tube weighted at the lower end with lead and balanced by a cap of absorbent material wet by its own dipping motion. Because evaporating water is cooler than air, the device is always cooler at the upper than at the lower end. The consequent leaps of the chloroform make it go, see-sawing perpetually on two nicely balanced points. Made in the form of a bird, it seems to be endlessly dipping its head to drink. This, also, in large enough size, would operate a machine.

In 1942, at the request of the U. S. Government, he perfected the rotary reflector that enables the army with a single searchlight to light an area 150 miles in diameter. After the war, not officially ended as of August, 1946, when he goes into production, one high-power bulb will light a whole town, rendering the electric lighting concerns frantic. Nothing hates improvements like an established industry.

But his crowning achievement (and may no thug crown him for it) is a 6-volt battery invented in April, 1946, immersed for 2 months in water without loss of power and still strong after 5 months, to date of writing. It is no larger than a very-thin watch. Two silver dollars stacked represent its size. It will do anything any 6-volt battery will do and more, too, because it will close down lead and zinc mines and hit Du Pont a good whack in the department of hakelite. It consists of two washers of his secret, self-made alloy, separated by a disc of ashestos and each equipped with a pole for wire connections.

Auriphone wearers will be glad to hear of a battery that goes in a watch pocket, or dressed up as a breastpin, may be worn as an ornament by deaf women, supplying all the current their hearing devices require. To lock your car, when equipped with the Madaler battery, disconnect the wiring and pocket the battery. It's safe until car thieves catch up with it. Car thieves dislike lugging 30-pound batteries to aid them in theft.

And to cap all magics, if the old man wants gold in the raw, he pours water on a dry strip of placer sand and hitches up a motor that operates a special disc that draws all the nuggets in the wetted sand to it. He loaned this to a friend who asked permission to dig for a day's earnings in a placer field being worked by strangers. They generously made way for him, expecting him to clean up \$5; but that evening they paid him \$168 for the dust he had collected.

When Madaler patents his new battery, he is going to organize for the public's benefit, selling shares at \$1 and selling the battery at a low price, for it costs him hardly anything to make.

THE END

SPACE SHIPS LIMITED

III. Gravity

By JACKSON ROSS

★ **M**AN is a terrestrial animal. Although the air extends more than 300 miles above the earth's surface, he goes crawling around the bottom, like a mud puppy in a puddle. Even when he flies he needs oxygen over 10,000 feet and cannot live without it over 20,000. Man has to live in the lower 1/100 or so of the vast air ocean.

Altitude causes many strange effects upon this earth-crawling anthropoid. If he flies too high without a pressure suit or cabin, he gets the bends just like a deep sea diver whose surfaces too fast. And if he should get as high as 63,000 feet in an unpressurized atmosphere without death overtaking him, he would die then—of drowning in the steam from his own boiling blood.

We are so accustomed to the effect of air pressure upon our bodies from the outside pushing in and from the inside pushing out that we never think of it. We never think of it, that is, unless we fly high or seek to climb Mount Everest.

Parallel with this universal effect of air pressure is the universal phenomenon of gravity. It is possible for us to test the effects of loss of air pressure by going into pressure chambers, or flying in an airplane. But we have not yet been able to test the effects of loss of gravity.

Yet if we clambered aboard a space ship and took off for Venus or the Moon, there would be times in our journey when we would weigh, literally, nothing. The sensation of weighing nothing is something that no man yet has ever experienced. Is there something in our physical makeup that demands that we weigh something, just as there is something that demands that our bodies be pressurized?

Quite likely there is. There must be a number of bodily effects which depend solely on gravity. But we will never know what they all are until we actually make a space flight. By then it may be too late unless we find some way to overcome the effects of weightlessness.

It is true that in space we never arrive at a point where we weigh absolutely nothing. Even a light year away the gravity of earth would have some effect—though an infinitesimal one and many other stronger but still minor effects from other gravities would be felt more. Even at 28,000 miles above the earth, a 160-pound man would weigh only about 3.3 pounds. Somewhere between Earth and the Moon, the two gravities would cancel so that complete weightlessness might exist, though only for a brief while. As we approached closer to one or the other, the effect of its gravity would be increasingly felt. Until we were close to a heavenly body, however, weight would be negligible for all practical purposes.

Imagine yourself in a space ship far out toward

some celestial goal half a light year away. You would probably be wearing magnetized shoes so you could walk about the metal floors. Otherwise you would take off in any direction you started for until you collided with something in the ship. Your body might just stay suspended until you could grab at a fixed object and pull yourself back to the floor.

Every possible object would have to be fastened down. If you tried to drink water out of a tumbler you would find that it wouldn't pour since, of course, neither it nor its contents weighed anything. You could move the tumbler out carefully and the water would stay suspended in the air, like a shining globule of transparent jelly. It would spread over and soak anything it touched. You might, of course, suck liquids out of a sealed container by means of a straw, or squeeze them out of a collapsible tube, like anchovy paste. All your foods, except those firm enough to grasp or spear, would have to be taken similarly.

You might read this magazine without holding it. Place it anywhere in the air and it would remain suspended there. If it started to drift away you could pull it back easily—provided you yourself were fastened down. Otherwise you might follow your arm as you reached for it.

There are at least two ways by which we could create an artificial gravity but neither seems to be very practicable. De Seversky has suggested the most feasible one. He would overcome the weight problem by keeping the space ship accelerating. We know that when we step on the gas of our automobile we actually weigh somewhat more while the car is accelerating. We can even feel ourselves thrust back into our seats with the added weight.

If we could accelerate at a constant rate of 32 feet per second, or 1G, our weight would be unchanged by regular earthly standards even after we had passed beyond Earth's field of gravity. It is possible that rocket motors some day will be constructed to provide constant acceleration of 1G but such motors by any standards we have now cannot be very economical. And with any practicable fuels known today, such a solution is impossible.

ALL seriously-proposed interspatial flights are based upon rocket craft using rapidly-burning oxygen-carrying fuels. These fuels would give the space ship enough initial velocity to escape from the earth. That escape velocity is about 25,000 miles per hour toward the sun and about 95,000 miles per hour away from it. All space ships so far proposed are designed for just such ultimate velocities. After they have achieved the velocity of escape from the earth's gravity, their power would be shut off. They would continue free-

wheeling through space at the velocity reached at the time their motors were cut off because there would be no friction to slow them. But the point is, they would instantly stop accelerating. There would be no continuing "G" effect and their passengers would become, for practical purposes, weightless.

To maintain accelerations of 1G for any length of time would require far more fuel than such space ships could ever carry. Yet they are about the limit of design that now seems possible. To be economical, rocket ships should start out with accelerations of more than 1G and be designed to free-wheel through space without power once they have attained their escape velocities. Severson's proposed ships are further uneconomical for travel within the solar system because flight would not need to be at such high speeds as his proposal would entail.

Constant accelerations of 1G, for example, would have us going at the rate of 78,480 miles per hour after one hour of flight (which would be satisfactory enough). But after 10 hours at the same rate we would be traveling about 784,800 miles per hour. We would have to keep on increasing this speed just as long as we wanted to keep the artificial gravity effect of constant acceleration.

Midway in the journey, our rocket ship would do a sort of half-roll and the engines which have been accelerating us now would be decelerating so that we would be going slow enough by the time we reached our destination. For all practical purposes there is no difference between acceleration and deceleration. If both were 1G, we would continue to weigh the same as on earth. When we arrived within the field of gravity of our destination, our rocket motors would gradually be throttled and we would ease to a gentle stop.

Such long acceleration might be possible with atomic rocket motors. But, as we have said heretofore, atomic power does not seem feasible for space ships because of the exhaust radiation so dangerous to unprotected citizens of Earth.

Now another method to overcome gravitation problems is to create an artificial field of gravity. The British Interplanetary Society has suggested that ships be sent off into space in a spin uncontrolled by side jets. Another proposal, made more seriously, is to build the rocket in two parts, connected by a cable. One part would contain passengers, food and so forth. The other would carry the rocket motors and fuel. These two parts could be separated and would revolve around each other at opposite ends of the cable. Because there is no friction in space, this movement could continue indefinitely once it were started. Speed of revolution would be controlled by regulating the length of the cable and, it is believed, a duplication of gravity effects would be achieved.

This method essentially substitutes centripetal force for De Severson's proposal of straight-line acceleration. It would seem to be extremely awkward and difficult to manage. Furthermore, if additional acceleration power were needed in space,

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It would be difficult to direct the power. It could be hard to land safely or to maneuver such a rocket craft.

A very serious objection certainly would be dizziness. If you're ever ridden a high-speed merry-go-round you can understand the nausea which might result. The dizziness might be more serious than the weightlessness it was designed to overcome.

"Well, why get so excited over weightlessness?" it is asked. "Of course it would be unpleasant to space travelers but is it really anything to get excited about? Perhaps it would be no more harmful to bodily functions than is floating on water where, if a man were to float onto a scale, he would weigh nothing."

The answer is, of course, that the two situations are not parallel. In water, a man is buoyed just as surely and weighs just as much as if he is lying on a mattress. Put the scale under the mattress, and his weight will register. Submerge him

in a bath tub and put the scale under the bath tub, and his weight again will register.

It is simply impossible to achieve weightlessness on earth because gravity is omnipresent. Therefore it is impossible to measure what would happen if it were absent. But the reader can imagine a few difficulties concerned with ordinary bodily functions. The mere matter of elimination, for example, would become an extremely difficult and unpleasant problem to cope with. Consider, too, the matter of arterial tensions throughout the body. They are designedly higher in the lower extremities to raise the blood back to the heart. The body is designed for the gravity conditions met on earth, and the effects of other conditions are unpredictable but potentially serious.

It is significant that so much serious thought has gone into attacking this problem of inter-spatial flight. Some students believe that it must be solved before interplanetary flight can be solved.

DISCUSSIONS

AMAZING STORIES will publish in each issue a selection of letters from readers. Everybody is welcome to contribute. Bouquets and brickbats will have an equal chance. Inter-reader correspondence and controversy will be encouraged through this department. Get in with the gang and have your say.



Address Your Letters to:

AMAZING STORIES "DISCUSSIONS," ZIFF-DAVIS PUBLISHING CO.

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"DEVILS TOWER" WRONG NAME!

Sirs:

The following was told by Isee-o, a Kiowa soldier at Fort Sill, Oklahoma Territory, in 1897:

"Before the Kiowa came south they were camped on a stream in the far north where there were a great many bears. One day seven little girls were playing at a distance from the village and the bears were just about to catch them when they jumped up on a low rock—about three feet high. One of them prayed to the rock: 'Rock take pity on us. Rock, save us!' and it heard them. It began to elongate itself upward, pushing the children higher and higher, the bears still jumping at them and scratching the rock, until the children were pushed up into the sky, where they now are, seven little stars in a group. In the winter when they are just overhead it is the middle of the night. The Kiowa call this rock 'Tso-aa' or Tree Rock."

The Cheyennes have a similar legend about the Bear Lodge near Sundance, Wyoming. The Dakotas call it "Mato-gi" or Grizzly Bear's Lodge. Captain W. F. Reynolds in his report of exploration of

1859-60 mentions it as follows: "Far in the distance up the valley of the Cheyenne the eye noted the singular peak of Bear Lodge rising like an enormous tower."

The following is from the Wyoming State Tribune: "MATEO TEPEE (Bear Lodge). Little is known of the Indian life of the immediate vicinity, though the Sioux and Crows hunted and camped near the tower at times. Traces of old camps or villages have been found along the Belle Fourche river and its tributaries, and even today, old relics are picked up. To the Indian it was a place of deep mystery and big medicine. Rumors still persist of hidden caves beneath the tower where ancient councils met."

E. M. F., Box 395, Upton, Wyoming.

Well, at least this letter settles one question regarding the stone-tree formation mentioned in our article in the June issue. The name of it is not "Devils Tower" but "Bear Lodge." It should appear as "Bear Lodge" on any map which purports to be accurate, since this is its historical and legendary name. And it seems even the Indians regarded it with special awe.—Ed.

LETTER FROM SHAVER

Dear Rap:

On the very powerful cavern microscope, cavern technician, a woman who has read a few hundred thousand minds and really knows what men think when they do important work, *looked at some dero brain micro-sections and found a parasite peculiar to the dero!*

The bug looked about an inch long in projection to me, and it looked like it was in a pupa case, reddish purple and striped around with lighter, almost yellow stripes.

She says the real size is very small—we might see it with our best microscopes, and very definitely would see it if we looked with electron microscopes for the parasite peculiar to the dero.

We have deros on the surface, too, you know. Our Capones, Hitlers, Dillingers—are deros.


She thinks the parasite acts to a dero like a pilot ship acts to a shark—reacts when the dero sights a chance to be devilish, gives off a pleasant reaction when it is cruel, derives satisfaction when its dero host gets his hooks into a victim, and is the cause of the personality we who know the caves call the dero. She thinks it is only a contributory cause of deroism (which is much larger than any parasite) but it is a very large cause, just as a pilot fish is a very large cause of a shark sighting its prey.

She insists that the detrimental energy is the real cause, and the parasite she has discovered *only* in dero brain matter is a factor to deroism somewhat like any weakening parasite is in causing disease—it opens the way for deroism by destroying the real brain and leaving only a thing responsive to stimulae detrimental: i.e.—stimulae the parasite itself reacts to: "blood is food," "pain is pleasure" etc. The actions of this parasite in reacting backward to stimulae is obvious in deroism once some thing is given to the matter. When the subject feels pain, *the parasite is thrilled*. It always gets food by causing pain in the matter of the brain and nerves. It is a thrill like eating is a thrill; the thrill of a fisherman hooking a fish—he causes the fish pain, but it is pleasure to him. Thus the parasitism is also obviously the cause of masochism—the victim gets pleasure from pain!

I think you should make a special point of this woman's discovery, Rap. It is fundamental and vital, as well as world-shaking in its importance. Ask world science to help in verifying it for the surface world.

That is what she wants—world science to find that parasite too, and to see its nature, and to do something about it.

If science, in spite of its backward attitude to date on every new discovery everywhere, could *this once* be broad and open to a new and vital fact; could make a thorough search of brain matter as if it knew how terribly the world needed to find the real cause of evil, and then find a specific drug which removed this parasite from a man's



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body—just as we know to give a puppy worm pills when it has worms—it would be the biggest step forward in science today.

She was very amused that her discovery had to be given to *Amazing Stories* for publication! That nowhere on earth was there any modern open-minded people for her to bring her most vital discovery to for understanding and publication.

This discovery is "on the point of effort" and is the greatest step forward in modern times. If we can get medical technicians to recognize that evil has a cause medically curable by drugs, they will find that drug and they get it to every evil man they can get their hands on in their work.

The parasite was also shown me as it wriggled out of the pupa case, leaving behind in the flesh an empty, transparent shell, and these shells leave a granular place in the flesh, many of them give a peculiar appearance to the matter of the brain. They cannot help but find it if they look!

Richard S. Shaver,
Rt. 2,
Lily Lake,
McHenry, Illinois

We publish this personal letter from Mr. Shaver to give you some idea of what our files contain from Mr. Shaver and others. We also publish it because it seems logical to us that much of evil is due to what is in men's minds. It certainly won't hurt to re-examine the tissue of diseased brains, that is of such types as those we term "surface dero"—the kind who slay on impulse, for reasons of sadism, at the beck of voices, and for no reason at all they can define immediately after. We have electron microscopes. Why not look at some of the brain tissue of that type of person, just for pure curiosity if nothing else? Why couldn't evil be a bug, just like any other disease? And wouldn't it be funny if that phenomenon the spiritualists call "obsession" was some little bug

like this? We often wonder if the whole darn thing isn't as simple as all that?—Ed.

"GONE FAR ENOUGH?"

Sirs:

Don't you think that this "Shaver thing" has gone far enough? Let us do a little analysis on this business. First, shall we consider the age of "Mother Mu?" Geologists have computed the age by estimating the amount of lead (the mineral) which is the end product of pitchblend or radium ore. Stop me now, if I'm wrong; it's been nearly twelve years since my college geology. Now, lead is found in abundance in nearly all geologic strata and in widespread locale. Would it not follow that because the amount of lead and the tremendous radioactivity that this mineral had before it reduced to lead, that the earth was highly radioactive? Logic, then, would tell us (assuming the above points are acceptable) that life on the earth could only occur on the cessation of this radioactivity. Or is there now a repercussion and this theory upset?

Before we leave geology let us consider the ice ages—those known, that is. It would be a little difficult to live even in caves as deep subterranean cities with a 25,000 year old icebag on your head. There are other facts in geology that would be an open question should Mr. Shaver or some of the others who agree with him like to answer then.

Consider the major geologic faults and the depths to which they penetrate. Please, do not think I am doubting Mr. Shaver's sincerity, or yours, but it appears that scientific answers to these known facts would win adherents to your cause.

I have many questions that I'd like to have answered. For example, the latest medical theory that old age is caused by the accumulation of carbon-monoxide poisoning and although radioactive elements will cause death, the overall picture indicates carbon-monoxide poisoning. However, I'll be satisfied with one answer at a time. How could life have reached its high state of development and leave when radioactivity drove them away, when the radioactivity was here first? Answer that one, you adherents of the "Shaver Mystery" and we'll go on to the next question. One at a time, boys, remember you're not talking to a doubter, just an agnostic. It ought to be easy.

Dudley G. Cone,
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realize what you are saying? Lead from radium is not the same as lead from just lead. Its electronic structure is a bit different. Just like the difference between U-238 (Uranium) and U-235 (fissionable Uranium).

So, here you try to disprove Shaver's claim to the race of Titans who left the earth because of increasing radioactivity, by saying there was more radioactivity to begin with than now. You try to substantiate that by pointing to the immense amounts of lead on the earth and in it. You link that up to lead from radium and say there is no differentiation. Okay, we'll stop you. You are wrong. And in twelve years, you've forgotten a lot and mixed up a lot more.

Now, about the ice ages. You say "known" ice ages. We've studied geology too, and we know of no "known" ones. Theoretical ice ages, yes, deduced from "glacial drift" "scratches on bed rock," etc. But any actual proof, no. That drift material could be from floods as well as ice. The scratches could be from rocks and debris as well as ice. And besides, some of the scratches indicate travel in a northerly direction. To accommodate for that, you have to turn the earth over a couple of times so you don't have glaciers moving backward. Ice ages? Purely a theory, as yet not proved. Even the so-called "ice caps" of Mars have now been thrown into severe disrepute. They are not ice at all. Only a fool would state that such tremendous areas of ice could melt back for hundreds of miles in a short two or three months, and then freeze up again. Especially when even in the "summer" the surface of Mars never seems to get above 60 degrees (so say the bolometers of science). Our own ice caps don't budge a blessed foot under the influence of summer! And since when could ice on the surface influence the temperature more than ten or twenty feet down? The deepest places of frost in the soil come to only six feet in Siberia, where it's almost always winter.

We do consider the major geologic faults. Shaver even mentions that great area of caves and tunnels are impassable now because of rock faults. So we agree with you. And you agree with us.

We are immensely interested in your announcement of the latest medical theory that old age is caused by carbon-monoxide poisoning. We must have missed that, unless you read it in *Amazing Stories*, which is the only place it has come to our attention to date. If true, we'd like to know more about it!

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at his elbow, and you are welcome to borrow any of the books in it at any time. They make fully as entertaining reading as Shaver, if not more so. And you'd be surprised on how much they agree, if you don't misinterpret either!—Ed.

A PSYCHIC SPEAKS

Sirs:

I have read every copy of *Amazing Stories* in which the Shaver Mystery appeared, except for the first story. I would appreciate being allowed to speak for those of us who are tired of seeing the truth butchered out of all recognition by those who ridicule a subject they know nothing about, namely the occult.

I am a Christian and a psychic and happen to know by first hand experience that the mysteries of magic are not as Mr. Shaver pictures them—a mere sham to cover up for the dero. An occultist should understand the mysteries and principles of his science better than an outsider, so why not let an occultist plead his own case?

The real mystic doesn't deal in unrealities, but is a true experimental scientist with extended faculties. The spirit world is not a friction of superstition, but it is a portion of the vast natural universe.

The plane on which we live we call the "chemical region." Beyond this (and interpenetrating it) is the "etheric region." It is here the forms of life we call spirits begin to appear. There are numerous planes of existence all manifesting in the same place, like bands of radio frequencies in the unseen worlds, but we may mention that it has other divisions (kingdoms) beyond the etheric.

The human soul is not an abstract theory or religious invention, but the occultist sees and treats it as objectively as the rest of the organism.

The "Ray" know of these things and use the knowledge in devious way with and without the old "mech." But whichever way they use magic, we should keep in mind that all science is one and no really adult man would deny his God or the supernatural because he has seen the great old energies of magic on this plane.

I also happen to know that it isn't necessary to use a machine to project the soul or make the unga doll work for good or evil.

It isn't hard to tell why Mr. Shaver isn't rubbed out by the dero. I can just hear them add a new verse to "T'll be my demon glory." Oh yes, Mr. Shaver will live.

However, I do admire Mr. Shaver for upholding love in the sweet light of the old nature teachings. I enjoy the love angle of stories and I am always thrilled by his love of the beautiful.

I believe in the blood sacrifice of Jesus Christ and if you publish this letter I do not wish to be identified with any cult which is anti-Christ, or anti-sex to any extent whatever.

Victor H. Anderson,
116 Adams St.
Bend, Oregon

Quite apparently, psychics also see the "mech" Mr. Shaver has seen in his caves. We don't argue with what it is, but we are much interested in this single point of agreement. As for the etheric regions, it is a strange coincidence that Mr. Shaver's story in this issue is about just such an etheric region. Only he doesn't go into planes of frequency bands. However, we do not agree with you about Shaver being used by the dero for propaganda. It would be hard to decide, assuming that anybody was being used for propaganda, whether it was Shaver or the psychics. Your editor would hate to say which was—except that he believes neither is. He detects a common base on which Shaver and all psychics stand. Shaver's viewpoint just seems easier to us to prove or disprove, without dying to do it. Your editor would love to talk to the dead, but if he did, he wouldn't believe what they said any more than he believe Shaver or a psychic—or just as much. If a "ghost" told us he'd seen a "mech," then we'd give it some credence, because there would be several confirming sources. Where there's smoke, there's fire. But let the ghost tell your editor he's the editor's great grandpappy, and we'll be awful bullheaded about believing it!—Ed.

AN INTERESTING FIND

Sirs:

About eight years ago, while working a lead and zinc mine close to Hackerville, Oklahoma, my husband found a head that had been hewed out of solid rock, and resembled very much the idols the natives or Indians worshipped many years ago. This rock was found on the second level of the mine, about 185 feet under the ground.

The description is very interesting as it had two very large ears that had been chiseled out, as the markings on them were rather perfect then. They protruded out from the head about four or five inches. The eyes were fixed as round holes rather large. Its chin ran down and resembled the mouth of a cow, only the line for the mouth ran somewhat underneath the chin. I really know it has been chiseled, for behind the head part which is flat, there is a dent, a chiseled round hole, not very deep as if it had stood on something to support it.

In blasting, one point of one ear was broken off and came off as a clean break. The rock was rather light in color and very slick looking, and very different from the mine rocks. It was very much overweight for its size and when exposed to the light it turned a peculiar dark color and showed traces of some shiny material on the outside. It is now at the Shiffendeker Park Museum in Joplin, Mo. We haven't given it to them and I am pretty sure they still have it. Maybe someone could help me figure out a reason for it being that deep under the earth, as it has always had me guessing.

Mrs. Lorene Patter,
Picher, Oklahoma

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Certainly a man-made relic buried in solid rock that far underground should be an exciting find. If any of our CHMBS near Joplin care to look into this, perhaps it should be brought to the attention of experts. If its age can be established, it might be an important find.—Ed.

"TRY A LIE DETECTOR!"

Sirs:

Try a lie detector. Perhaps you have received letters from others telling you to try a lie detector on Shaver, but I've never seen any letters to that effect.

This is for all the skeptics and myself, I suppose. A lie detector should work on Shaver. Don't get me wrong, I'm not an out and out skeptic, but it should be interesting to hear the results of such a test.

I did have a queer experience one night in a bar and cafe while my wife and I were eating a sandwich, a fellow whom I'd never seen before or ever seen since, sitting next to me started talking to me, out of a blue sky about the dero although he didn't say dero. I was quite interested and tried to question him, but evidently he was afraid to talk, or something, because he must have realized he made a mistake. I couldn't get anything out of him that made sense, and what he did say was so many months ago that I can't remember now what it was.

Keep up those Shaver stories.

P. J. Marsippa,
412 4th Ave., So.,
Great Falls, Mont.

You have a fine idea there, and your editor is willing to submit to the lie detector test too. As a matter of fact, we've contacted two local universities with a view toward carrying out this test to the fullest. We've a hunch even your editor would be startled by the results. At least we'd settle this business of a hoax for good. We'll do it or bust!—Ed.

A QUESTION

Sirs:

The Shaver Mystery is swell! (At least I think so). I have been a Shaver fan for quite some time and although I can't definitely say his "proofs" actually proved anything, which would be impossible to do in words, I think they were very convincing. Would you mind answering one question? What will you do for the people of these caverns if and when you convince the readers it is true? What if a few hundred readers like myself wanted to help these people if they existed?

John A. Slack,
38-35 204 St.,
Bayside, L. I., N. Y.

Certainly surface people would do all they could to help the cavern people, if communication could be established! Why not!—Ed.

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MONEY ISN'T EVERYTHING- (OR IS IT?)



BY GROUCHO MARX

WHAT do you want to save up a lot of money for? You'll never need the stuff.

Why, just think of all the wonderful, wonderful things you can do *without* money. Things like—well, things like—

On second thought, you'd better keep on saving, chum. Otherwise you're licked.

For instance, how are you ever going to build



that Little Dream House, without a trunk full of moolah? You think the carpenters are going to work free? Or the plumbers? Or the architects? Not those lads. They've been around. They're no dopes.

And how are you going to send that kid of yours to college, without the folding stuff?

Maybe you think he can work his way through by playing the flute.

If so, you're crazy. (Only three students have ever worked their way through college by playing the flute. And they had to stop eating for four years.)

And how are you going to do that world-traveling you've always wanted to do? Maybe you think you can stoke your way across, or scrub decks. Well, that's no good. I've tried it. It interferes with shipboard romances.

So—all seriousness aside—you'd better keep on saving, pal.

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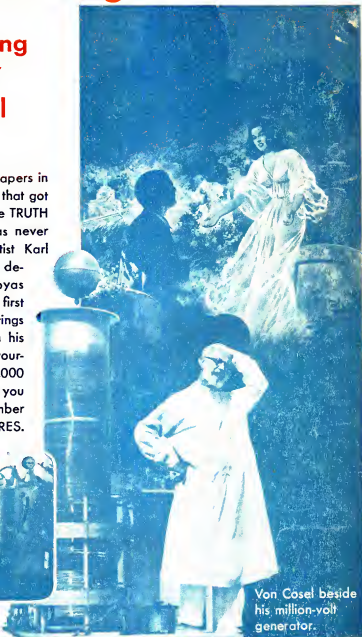
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